

MACHINE TOOL BLUE BOOK

OCTOBER 1942

HARDINGE
ELMIRA, N.Y.

Performance has established leadership for HARDINGE High Speed Precision Lathes. Their preloaded ball bearing spindle construction make them *fast, accurate and dependable.*

SPECIFICATIONS:

- 1" collet capacity
- 6" step chuck capacity
- 5" jaw chuck capacity
- 9" swing
- 36" bed

Lever speed control with spindle brake

8 speeds forward and 8 speeds reverse from 230 to 3900 R. P. M.



HARDINGE
HIGH SPEED PRECISION LATHES



Mitering a structural angle iron—with a MARVEL No. 8. The blade is fed into the work. Work is held stationary on the bed in quick action vise.

MARVEL SAWS

Shipbuilding calls for Universal tools

There's a lot of sawing—cutting-off, mitering, notching and special cuts wherever ships are being built, and work comes in all sizes, too. That's why you'll find MARVEL No. 8 Metal Cutting Bandsaws in shipyards and Navy yards, as well as in tool rooms and die shops.

The MARVEL No. 8 is the most universal band sawing machine built. It will snap off $\frac{1}{8}$ " drill rod cut off an 18"x18" structural shape with equal efficiency, or will save hours of machining by roughing work to size and shape. It will cut at any angle from 45° right to 45° left, has a large "T" slotted table (for holding irregular shapes, special fixtures, etc.) and both power and hand feed. It is a busy machine wherever found, for it does many different jobs and does each one well.

ARMSTRONG-BLUM MFG. CO. "The Hack Saw People"
5700 Bloomingdale Ave. Chicago, U. S. A.

Eastern Sales Office: 225 Lafayette St., New York

The Speed Features

HOBART ARC WELDERS are stepping up America's production offensive



is New Arc Welding
ok tells you how you can
T. MORE out of
our arc welders -

performance in man-hours
machine hours is of prime
importance today. Have you
break up on latest tech-
niques and procedures in weld-
ing to get greater efficiency with
effort. "Practical Arc Weld-
ing" shows you HOW.

\$200

GET YOURS TODAY! Postpaid



Hobart Speed Features are not attachments or devices... they're inherent in Hobart quality and design; engineered through years of research.

Simplified Control is a result of an attempt to build the welder to meet the operator's demands. An extremely important factor today.

Remote Control lets the operator do a top-notch job any distance from machine. A great aid to speed and efficiency.

Polarity Control by a mere flip of a switch. Simple, but positive. It's certainly a distinct advantage.

Cool Under Continuous Operation. Unusual ventilation principle lets three shifts operate welder 'round the clock.

Hobart

"Simplified" ARC WELDERS

HOBART BROS. CO., Box TB-102 TROY, O.

- ☐ Send information on "Speed Feature" Welders
- ☐ Send _____ copies "Practical Arc Welding"
- ☐ Check Enclosed ☐ C. O. D.

NAME _____

ADDRESS _____

CITY _____

STATE _____

"of the World's Largest Builders of Arc Welding Equipment"

Spring tempered COLLETS



Order From Stock

Scientifically heat treated to a true spring temper, "Rivett Mark" collets resist wear and hold their spring longer than collets of any other make. As standard equipment on all makes of lathes and millers, (see Rivett Bulletin 1008) they may be ordered for immediate delivery from the following stocks:

CHICAGO

R. E. Ellis Engineering Co.
565 W. Washington Blvd.

DETROIT

Charles A. Strelinger Co.
149 E. Larned Street

BOSTON

Rivett Lathe & Grinder Inc.
18 Riverview Road, Brighton

RIVETT LATHE & GRINDER INC.
BRIGHTON, BOSTON, MASS.



HARDINGE PRECISION LATHES

- Extreme Accuracy
- High Spindle Speeds
- Ease of Operation

HARDINGE Precision Lathes combine these three important attributes for production:

• **Extreme Accuracy** for the close tolerances demanded by today's rigid manufacturing standards.

• **High Spindle Speeds** mean greater production and a better finish.

• **Ease of Operation** enables relatively unskilled operators to produce parts to the necessary close limits without expensive tooling.

• **Performance** has established leadership for HARDINGE™

SPECIFICATIONS: 1" collet capacity, 6" step chuck capacity, 5" jaw chuck capacity, 9" swing, 36" bed, lever speed control with spindle brake, 8 speeds forward and 8 speeds reverse from 230 to 3900 R.P.M.

HARDINGE

HARDINGE BROTHERS INC., ELMIRA, N.Y., U.S.A.

ARMSTRONG



This war is being won with High Speed Steel in Armstrong Tool Holders

Victory begins in the tool rooms and machine shops, for striking power first takes form in jigs, fixtures and dies . . . in more and more machine tools, each operating continuously at the highest possible speeds and feeds.

Since the capacity of any machine tool is limited to the efficiency and capacity of its cutting point, we can afford, today, only the strongest and most efficient cutting tools with the finest cutting edge. This means, for all general lathes, planers, slotters and shapers, and for many screw machine and turret lathes, the correct ARMSTRONG TOOL HOLDER with a cutter bit of high speed steel.

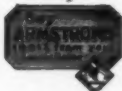
With high speed steel so essential to top efficiency, so widely needed and with our national supply so difficult to maintain, to waste high speed steel in forged tools is to delay victory because the same high speed steel consumed in one forged tool would supply high speed steel cutters for 10 ARMSTRONG TOOL HOLDERS—would go 10 times as far, would do 10 operations instead of one, would machine 10 times as many dies or jigs. Use ARMSTRONG TOOL HOLDERS wherever possible to

Save: All Forging, 70% Grinding and 90% High Speed Steel. This war is being won right now in jigs and fixtures—with High Speed Steel in the ARMSTRONG TOOL HOLDERS used in over 96% of the machine shops and tool rooms.



Armstrong Bros. Tool Co.
"The Tool Holder People"
308 N. Francisco Ave.
Chicago, U. S. A.

Eastern
Warehouse and Sales
199 Lafayette St., New York.



Machine Tool Blue Book

Hitchcock Publishing Co., 508 So. Dearborn St., Chicago

35,000 This Issue

Volume 38, No. 10

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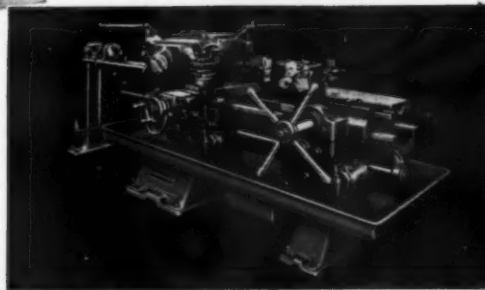
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YOU WOULDN'T TRADE THIS



LIKE many an early leader in the machine tool field, David H. Hilliard received his training in the Vermont shop, of which Jones & Lamson Machine Company is a direct successor. When war broke out in 1861, Hilliard worked night and day to complete a wagon load of heavy telescopic rifles. These he drove to Concord and presented to the Governor of New Hampshire to arm a picked company of Sharpshooters.



No. 3 Jones & Lamson Ram Type Universal Turret Lathe with standard bar equipment.



AUTOMATIC THREAD CHUCKS



OPTICAL COMPASS



RAM TYPE UNIVERSAL TURRET LATHE

FOR A WAGON LOAD OF RIFLES

861 a wagonload of rifles was a major contribution to national defense. In 1942 it helped some, but it wouldn't help enough.

On the vast scale in which the fate of the world is being weighed today, one of the greatest contributions to the survival of freedom is an intangible contribution, and it comes from the same original sources as Hilliard's wagonload of small arms.

This contribution consists of the skill, experience and adaptability of a machine tool engineering and precision manufacturing organization whose continuous development began with Hilliard's predecessors over a century ago. Equipped in turn by men like Hubbard,

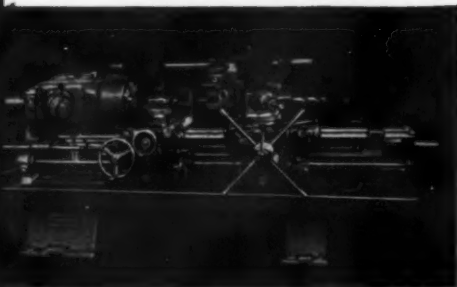
Kendall, Robbins, Lawrence, Howe and Hartness, this unbroken progress makes Jones & Lamson machine tool technique available to you in its present high speed, modern form.

With Jones & Lamson equipment you can speed war time production now, and with it later you will be in position to earn a living profit in the hard years ahead.

That's why it pays to put production problems up to Jones & Lamson engineers. That's why it is so advantageous to be Jones & Lamson equipped. Illustrated catalogs of this equipment are available, and inquiries from large plants or small receive careful study here.

JONES & LAMSON

MACHINE COMPANY, Springfield, Vermont, U. S. A.



Model 7A Jones & Lamson Saddle Type Universal Turret Lathe with standard chucking equipment.

Manufacturers of Ram & Saddle Type
Universal Turret Lathes . . . Fay Automatic
Lathes . . . Automatic Thread
Grinding Machines . . . Comparators
. . . Automatic Opening Threading
Dies and Chasers



PROFIT PRODUCING
MACHINE TOOLS

Model 7A
TURRET LATHE



FAY AUTOMATIC LATHE



AUTOMATIC OPENING
DIE HEAD

It's Your Treat Now...

Milling
WITH
HIGH SPEED STEEL

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI, OHIO

● Publication No. M-1160 Free to shop
men interested in higher production
through cutter conservation.

THE CINCINNATI MILLING MACHINE CO.
TOOL ROOM AND MANUFACTURING MILLING MACHINES SURFACE BROACHING MACHINES CUTTER SHARPENING

E CUTTERS WILL REPAY MANY TIMES

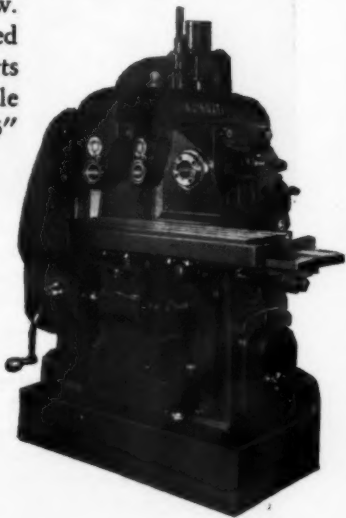
Depending upon how they are handled and used, high speed steel milling cutters can be as durable as an all-day sucker in the hands of a ten-year-old boy, or as fleeting as an ice cream cone. Nevertheless, it's not necessary to nibble with standard milling cutters. They have the possibilities of producing at a rapid rate, taking a man-sized cut, and machining an unbelievable number of parts before wearing out. The booklet illustrated at the left tells you how to develop and take advantage of these possibilities.

A thorough understanding of cutters constitutes an important step in production. For one thing, it reduces the number of times cutters must be changed on long jobs, creating an opportunity to use the production possibilities of bed-type millers, like the CINCINNATI No. 2-24 illustrated below.

Feed gears on these machines may be changed without the use of a wrench; arbor supports may be removed with the brace in place; table has dog controlled automatic cycles, with 125" per minute power rapid traverse. Complete data and specifications may be found in the illustrated literature mentioned below.



Right: CINCINNATI No. 2-24 Plain Automatic Milling Machine; catalog M-965 ... CINCINNATI No. 2-24 Automatic Rise and Fall Milling Machine; catalog M-909.



Quick Changes on Van Norman

RAM-TYPE MILLING MACHINES



*...from
Horizontal Milling*

...to Angular Milling

...to Vertical Milling

When the operator has completed a horizontal cut on a Van Norman Ram-Type Miller, and wishes to proceed to an angular or vertical cut . . . he does not need to touch the set-up on the table. All he has to do is undamp the swiveling cutterhead, swing it to the required position, redamp . . . and start the next cut. Only a matter of moments, compared with the time needed to reset the work. And one of the greatest sources of errors is completely avoided. This exceptional ease and convenience of operation provide gains in time, accuracy and out-

put. So today, throughout America's war industries, Van Norman Ram-Type Millers are delivering the goods in great plenty . . . and in plenty of time.

VAN NORMAN
Machine Tool Company
SPRINGFIELD, MASSACHUSETTS



In June, 1942, Van Norman was awarded the Army and Navy E in recognition of its war production record

New NOBUR TOOL makes burring a machine operation!



Removes burrs from inside and outside edges as fast as parts can be handled!



NOBUR USED ON FLEXIBLE SHAFT!

NOBUR burr removing TOOLS are used on any machine tool... lathe, drill press, portable electric drill or at end of a flexible shaft.

Furnished in 1/16" progressive sizes from 3/16" to 1". NOBUR TOOLS are the economical solution to your burring problems



USED on any machine, the smooth, clean, cutting action of the NOBUR will pass the most critical inspection. NOBUR is a time-saving, mistake-saving shop tool that eliminates slow, costly hand methods of burring. It lowers production costs and increases production by hastening approval of finished parts. Easy to operate... no skilled help is necessary... green 'trainees' or women operators can do burring with speed and accuracy... NOBUR minimizes costly reworking and enables the operator to do more in less time... NOBUR is simple in construction... rugged... important parts are hardened and ground... shaft is finished to a diameter slightly under its basic size... double-edged cutting blade is of special tool steel, cuts freely in either alloy steels or soft metals. Order through your distributor NOW... or write for literature direct to the

**NOBUR
MANUFACTURING CO.**
910 North Orange Drive
Los Angeles • California



**NOBURing IN AND OUT
AND THE BURR IS OFF!**

Which Costs Less?

**This Tool
is PRICED
Lower!**

**This Tool
PRODUCES
More!**

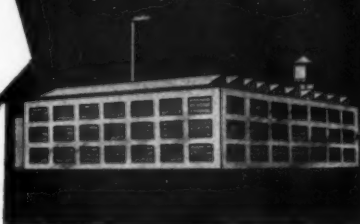
**THIS is the place
to find out!**

EXPERIENCED tool buyers know that it is false economy to buy cutting tools strictly on a price basis. Tool for tool, you get more production and lower actual cost with TECO than with lower-priced tools . . . through higher-speed operation, dependable uniformity and longer tool life.

Tool cost is a small part of operating expense. Original cost at a few cents more, resulting in dollars gained in extra production, proves the economy and value of TECO use.

Put TECO Carbide Tools to the test. Let

YOUR SHOP



your own production records furnish your proof. Grades and styles for practically every machining need. Tell us your requirements.

TUNGSTEN ELECTRIC CORPORATION
565 39th STREET • UNION CITY, NEW JERSEY

Branch Office: 2906 Euclid Avenue, Cleveland, Ohio
Representative: Architects and Builders Bldg., Indianapolis, Ind.

TECO

Pioneers in Tungsten Carbides
for over a Quarter Century



CARBIDE TOOLS

OUT of the O'TOOLS

10 ROUNDS—
AIR VS. HIGH-CYCLE
GRINDERS
ROUND 10



"SO I WOUND-UP AND GAVE HIM THE R. P. M. WALLOP"

• This was a new plant. The product: Marine turbines. They needed AIR for hammers. Should they get additional AIR capacity and use AIR grinders? Or should they get HIGH-CYCLE equipment for grinding?

Many of the tools were to be midget grinders. That's where AIR usually has it over HIGH-CYCLE. The tools weigh only a pound and two ounces and run at 20,000 R.P.M.—half the weight and twice the speed of the HIGH-CYCLE grinders.

So, in this Round 10, AIR got the decision and 77 Rotor AIR Grinders went to work.

How's your portable tool production? Call in the Rotor Analyst for maintenance tips that will help win the war! He has valuable suggestions and aids to make your tools produce more and last longer.

This wall chart is part of the Rotor Tool Conservation Plan. Aids for maintenance of AIR and HIGH-CYCLE tools free on request.



THE ROTOR TOOL CO.

CLEVELAND, OHIO

HIGH CYCLE

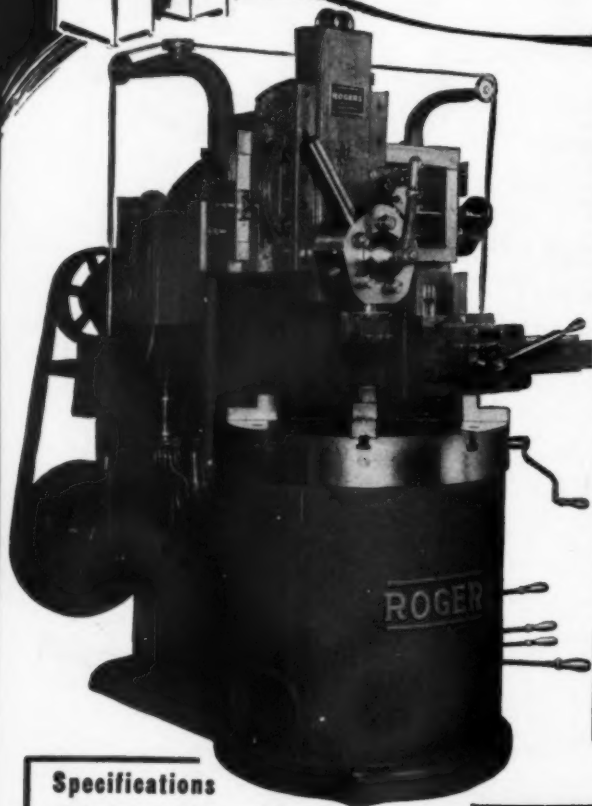
AIR

UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS

ROGERS "Perfect 36"

VERTICAL TURRET MILLS

practical features **HAVE**
STEPPED UP MY
PRODUCTION!



One of the many reasons for the increase in war production is the specially designed **Swivel Side Head**. This new Rogers development permits working at any angle each side of the vertical up to 35 degrees. It provides a simplified tool set for irregular shaped pieces.

Another feature is the built-in, graduated dial which saves time in making set-ups for original and second runs.

And still another feature is the level, horizontal table that makes it easier and quicker to slide the work into exact position for both drilling or turning operations. No lifting or balancing or locking up work! Be sure to call on Rogers today and get tomorrow to "Machine It on Level" with 36" diameter capacity Rogers Mill "Perfect 36."

Rogers are now making surprisingly quick deliveries at very attractive prices.

Specifications

36" diameter capacity... 5-sided main turret and 4-sided side turret... rapid traverse on main head... box type main and side rail, with saddle, swivel and tool stake... $6\frac{3}{8}$ " diameter spindle with 175 sq. in. V-shaped bearing $14\frac{1}{8}$ " in diameter... foot operated controls... standard and high speed models.

Knowing How Since 18

ROGERS MACHINE WORKS

FACTORY: ALFRED, N. Y.

SALES OFFICES: 125 ARTHUR ST., BUFFALO, N. Y.



OFFICIAL U. S. NAVY PHOTOGRAPH

Jarvis POWER TOOLS

READY FOR ACTION

Jarvis Power Tools as used in the manufacture of engines, propellers, planes, ship and instruments have done their part.

THE CHARLES L. JARVIS CO., MIDDLETOWN, CONN.

TAPPING ATTACHMENTS • FLEXIBLE SHAFT MACHINES • GROUND ROTARY FILES



★ *There's*
NO MOTOR WEIGHT
in the
WORKING TOOLS

on A *Mall* TRADE MARK **FLEXIBLE SHAFT GRINDER**

**An Operating Advantage
 On EVERY War Job that:**

- Reduces worker fatigue
- Cuts tooling time
- Increases safety
- Steps-up production
- Permits a more efficient motor winding to dissipate operating heat



**3 H.P.
 GEARED
 HEAD**

MALL Flexible Shaft Grinders are available for VICTORY PRODUCTION from $\frac{1}{2}$ H.P. to 3 H.P., with caster base or overhead trolley mountings for maximum portability in direct-drive or geared-head models. Constant working speeds range from 3450 to 4500 r.p.m., on 60 cycles.

Each unit has a constant speed, heavy duty full ball-bearing, dust and vaporproof or ventilated type motor that delivers 100% additional H.P. on a momentary overload.

★ ★ Quickly interchangeable tools for Grinding, Disc, Cone and Drum Sanding, Wire Brushing, Polishing and Drilling make these machines easy to keep busy.

Write, wire or phone for full details.

MALL TOOL COMPANY

7742 South Chicago Ave.,

Chicago, Ill.

THE SMALL SPLASH of the wave that will drown the Axis

PEKKING at you through the left porthole is a P&W cutter on the job. The work — an aircraft engine crankcase — stands still. The cutter makes its way around the face of a cylinder hole, slicing it down to design size with precision and dispatch.

As you'll judge from the flying coolant at the upper left, this is one of the splashiest jobs in metal working — which indicates the cutting speed and power of this P&W cutting tool.

Wherever *accurate* cutting is vital in American industry, P&W cutters, taps, dies, reamers, and end mills now are pounding out production 24 hours a day . . . hastening the time when we'll return a solid sock in the face for that slinking stab in the back.

Don't spare the pressure. Your P&W tools can take it.

PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD • CONNECTICUT



WHY WAIT WEEKS FOR TOOLS or PARTS?

★ **Make them the Same Day on a**

Thirty-two Stitching Dies 1½" thick cut from oil hardening tool steel in 23½ hours on the DoAll.

DoAll

● In addition to doing a fine job in regular production work, the DoAll is the 100% patriot today to which you can turn in emergencies.

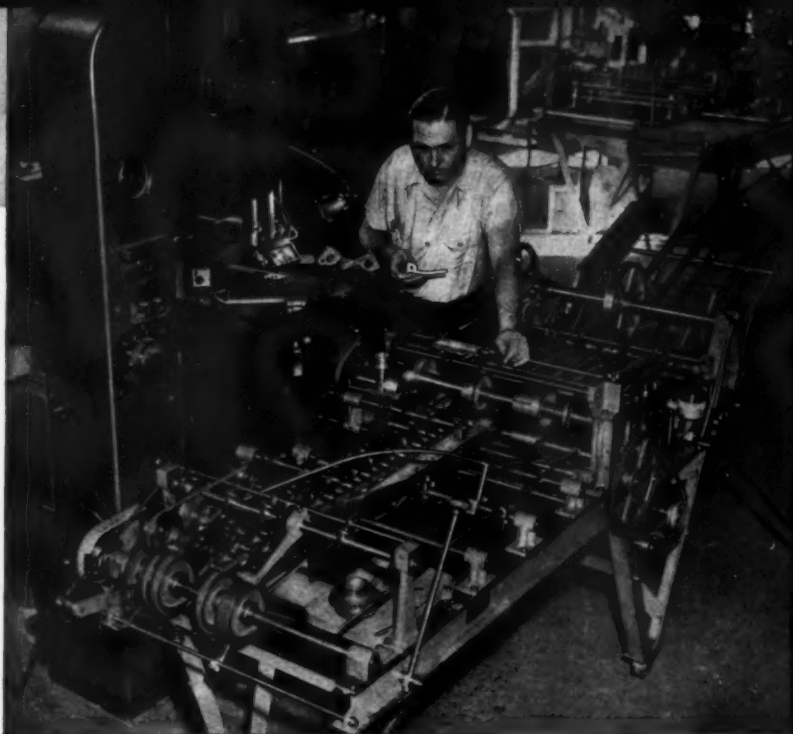
Don't tie up vital machines for weeks waiting for replacement parts from the factory. Make them on the DoAll—the fastest precision method for external and internal cutting without waste, of all kinds of metals, alloys, plastics, wood, etc. Finished jobs are ready for use—further machining is not necessary.

All external and internal shape cutting in making these special parts and molds was done on the DoAll.

A large airplane plant makes these Propeller Wrenches on the DoAll.

**STRIP-OUT
CONTAINER**

Pat. No. 2,255,577
Des. No. 127,313
Other Pat. Pending



25 different parts of this Automatic Paper File Folding Machine are now made on the DoAll—and without blueprints.

DoAll also makes special tools and dies, following a hairline layout in the least possible time. Short runs of metal products can be handled on the DoAll, relieving heavier, higher-priced machine tools of their work. Sheet metal or alloy can be blanked and 20 to 80 parts cut out at one time.

ASK FOR DEMONSTRATION

A factory-trained man will call with a DoAll and show you its production versatility, economy and time-saving features.

READ THIS BOOK—Send for a copy of "DoAll on Production", a picture story of this little giant of industry.

CONTINENTAL MACHINES, Inc.

100 S. WASHINGTON AVE.,

MINNEAPOLIS, MINN.

Associated with the DoAll Company, Des Plaines, Ill.

Manufacturers of Band Saws and Band Files for DoAll Contour Machines

THE EXACT SIZE FOR YOUR JOB



Model 10000 Under \$2500 Model 10000 Under \$2500 Model 10000 Under \$2500 Model 10000 Under \$2500

ON THE SPOT WITH A PRODUCTION PROBLEM?



... SEND A WIRE TO THE EMERGENCY PRODUCTION SERVICE DEPT. OF KEARNEY & TRECKER



Getting the tools to do the work is often more of a problem than the production job itself. Sometimes it just gets down to having the *know how* to use present equipment or merely adding a standard attachment which adapts or converts an existing milling machine in your plant to a particular operation.

When you are on the spot with a difficult milling job the Emergency Production Service Department of Kearney & Trecker Corporation is at your service. They have the *know how* to be able to suggest getting the most in performance from your present Milwaukee milling machines ... to extend their range of application and usefulness with standard attachments and accessories.

Kearney & Trecker believes that their Emergency Production Service can help you just as it has helped others faced with production problems. To avail yourself of it all you need to do is pick up your telephone and send a wire, stating your problem, to this Department. Immediately upon receiving your wire, arrangements will be made to have a trained field representative contact you at once. Depending upon the nature of your problem he will provide you with complete technical information or call directly at your plant.

The Emergency Production Service Department of Kearney & Trecker is maintained for your benefit—to aid you in your war effort. We urge you to make use of it.

Here is an exceedingly versatile attachment that should be put to work in your plant — to relieve machine shortage — to avoid the difficulties of getting new machines — to add to the range and usefulness of your present Milwaukee Milling Machines. It's the Standard High-Speed Adjustable Universal Milling Attachment, shown above in use in conjunction with a low lead attachment and rotary table for end milling a scroll. This is but one of many applications of this versatile tool, such as milling on dies, metal patterns, templets, T-slots, dovetails and other milling operations. When used with a rotary table, circular milling operations can be performed. When used with a dividing head with the attachment spiral milling operations can be accurately and rapidly performed.

Milwaukee M A C H I N E

THIS ATTACHMENT PINCH-HITS ON MANY PRODUCTION JOBS...



Look into this and many other Milwaukee milling attachments—to help solve particular milling problems—to break production bottlenecks—to extend the range and range of application of your present Milwaukee Milling Machines. Write for the complete file of literature on Milwaukee milling attachments.

KEARNEY & TRECKER CORP.
Milwaukee, Wisconsin

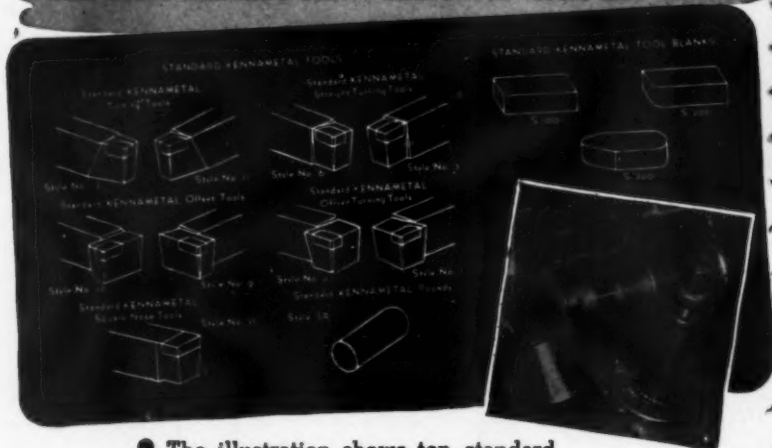


Write for handbook "Right and Wrong of Milling Practice"—to aid your men to become better milling machine operators.

KEARNEY & TRECKER
CORPORATION

T O O L S

9 out of 10 steel-cutting jobs
CAN BE HANDLED QUICKLY and CHEAPLY
 with these standard **KENNAMETAL*** tools and blanks



● The illustration shows ten standard styles of KENNAMETAL tools. They will be found suitable for the majority of turning, boring, and facing operations on steels hardened up to 550 Brinell. Save time by using these standard tools, or by ordering KENNAMETAL blanks and brazing your own tools.

All KENNAMETAL tools are more economical and more efficient than ordinary ones. Their great hardness, wear resistance and crater-resistance makes them outlast other tools, and do more work in any given time.

Visit The Kennametal Booth C-110 At The National Metal Congress

* INVENTED AND MANUFACTURED IN U. S. A.



Get the facts about
KENNAMETAL!
 Write for a copy of
 the Vest Pocket Manual
 containing full
 details.



"Stark"



Integral Drive

PRECISION BENCH LATHE

*new stream-liner incorporating
the old Stark accuracy and stamina*

THE first tool of its class with built-in Motor and speed changing mechanism (patented). Marvelously compact: nothing under the bench; no special h or cabinet needed; even bolting down necessary:

only moving control lever to right engages clutch, vertical position releases; moving left instantly brakes the moving spindle.

Standard (tool room) Model has time-tried taper spindle bearings 156 to 2200 r.p.m. — the best for sustained accuracy.

Speed (manufacturing) Model fitted with best precision pre-loaded anti-friction bearings, 260 to 3500 r.p.m.

Have 40 inch bed, 9 inch swing, 20 inches between centers; 1/4 or 1 inch collet capacity. Take regular STARK Attachments collets and chucks.

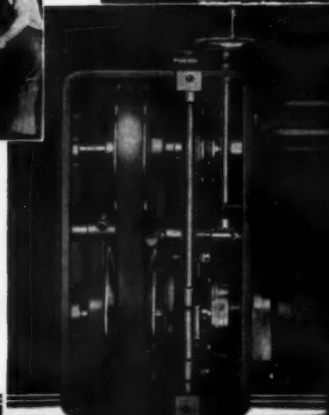
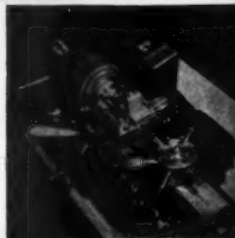
Stark (patented) built-in drive, integral with the Lathe itself, gives a 1/2 h.p. geared ball-bearing motor drive through a disc shaft and through V belts to the headstock, giving any split speed turn of the small hand wheel in front of operator.

Write for full information

STARK TOOL COMPANY

WALTHAM, MASS., U. S. A.

ESTABLISHED 1862



ORIGINATORS OF THE AMERICAN BENCH LATHE

Turning AND Centering



IN **1** OPERATION

With **R** and **L** Tools

This Combination Tool is the only Right and Left Hand tool on the market. Can be changed from right to left and vice versa in 10 seconds. Replaces 14 tools costing 4 times as much.

Here are some of the multiple operations that can be done with the R and L: Pointing work concentric with turned diameter; drilling and chamfering; turning and forming special shape or end of part while drilling or reaming; turning one diameter—chamfering two corners, facing end of part along with drilling or reaming; turning two diameters while drilling or reaming; turning shoulder concentric with stock diameter.

You can readily see the enormous savings in time, trouble and money that can be effected by the use of R and L Turning Tools.

Write for 44-page booklet describing all the uses of R and L.

R AND L TOOLS

1827 BRISTOL ST.

NICETOWN, PHILADELPHIA, PA.

LYON *Hydraulic* MATERIAL HANDLING EQUIPMENT

Built to Fit Your Special Needs

Hydraulic lift trucks
Hydraulic pallet trucks
Hydraulic elevating tables
Hydraulic die-handling trucks
Hydraulic sheet-handling trucks
Hydraulic stacking, tiering, and hoisting equipment
Utility trucks and skid platforms
Special purpose production machines, hydraulic-powered
Aircraft servicing and production equipment

Numerous designs
Available
in all These Units:

Special
Adaptations,
to Order:



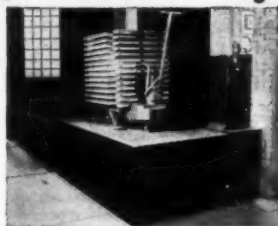
Double-Faced
Pallet Type Lift Truck



Portable Hydraulic
Elevating Table



Telescopic
Type Hydraulic
Elevating Table



Hydraulic Elevating Platform —
eliminates dangerous ramps.



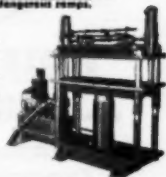
Toggle Lever Type
Hydraulic Sheet
Handling Truck

No matter what your handling problem . . . if it involves any of the operations in the list below . . . let LYON-Raymond's engineers help you find a solution. They have proved to scores of the largest companies in America that hydraulic operation is the fastest, easiest, safest and most reliable handling method.

CARRYING	REVOLVING
DUMPING	SPOTTING
ELEVATING	STACKING
FEEDING	STORING
HOISTING	TIERING
LEVELING	TILTING
LIFTING	TRANSPORTING
LOADING	UNLOADING
LOWERING	UPENDING



25-ton Hydraulic Press —
a built-to-order machine.



Standard Model Hydraulic
Lift Truck



Hydraulic Die Handling Truck
(with die separator and winch)

ASK FOR LITERATURE
Special bulletins are available outlining various uses of LYON-Raymond equipment in heavy industry, in processing plants, in aviation. Tell us your problems and we will send literature that applies.

LYON-Raymond Corporation

Formerly Lyon Iron Works

Established 1900

181 Madison Street

Greene, N. Y.

Material Handling Equipment Helps Solve the War Labor Problem

Industry Has Turned to SUNNEN PRECISION HONING

**For Speed—Accuracy—
and Super-Smooth Finish**



Write for FREE BULLETIN

— giving complete information. Or if you prefer, a Sales Engineer will call and demonstrate this equipment in your plant on your job.

★ Close tolerances—super-smooth finish for perfect functioning of parts, while important to other industries, are vital throughout the field of aviation.

That's why hundreds of leading producers of war equipment, munitions, the manufacturers of aviation instruments and controls, have adopted Sunnen Precision Honing for sizing and finishing internal cylindrical surfaces from .185" to 2.400"—quickly, accurately, and at a lower cost.

Does Not Require Skilled Labor

Workers in "teens" can handle jobs in "tenths" after a few hours' instruction and practice!

This practical, inexpensive, economical machine can be set up and work located in one minute. Size adjustment can be made while machine is in motion with work on mandrel. When expensive reamers or broaches get a little undersize, many manufacturers remove the last thousandth or so with the Sunnen Precision Hone. Relieves big internal grinders for other jobs.

Corrects errors of out-of-roundness or taper caused by previous operations. Maintains alignment. Facilitates duplication of sizes.

In plant after plant, the Sunnen Precision Hone is showing production increases of 100% to 500% with corresponding savings in costs. For faster, lower-cost honing of small diameters, put Sunnen equipment to work in your plant.

SUNNEN PRODUCTS CO. • 7935 Manchester Ave., St. Louis, Mo.

Canadian Factory: Chatham, Ont.

Typical Examples

As you can readily appreciate, we cannot publish detailed information on Sunnen "success stories." However, here are a few general examples of the type of aviation parts being handled on the Sunnen Precision Hone.



Aluminum Aircraft Link "produces high finish without bell-mouthing."



Aviation Hydraulic Cylinder made of Aluminum-Alloy. Improves the quality of the bearing surface. An extremely smooth surface-finish is secured.



Saved time in producing a smooth, accurate finish on this bronze remote control valve body.



Bronze Valve. The Sunnen method of honing is used to secure a high finish and accuracy.



Hardened Steel Ring Gauge—finished to an accuracy of .000025" for roundness and straightness.



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CARBIDES, BOARDS, BALLS FOR ALL INDUSTRIAL PURPOSES
MANUFACTURERS OF ALL KINDS OF DIAMOND TOOLS



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Representing—

DEPENDABLE QUALITY IN DIAMOND TOOLS



As every diamond buyer knows, there are many types, sizes and grades of diamonds, differing vastly in cutting ability and value. Therefore it requires skilled diamond experts to properly classify, cut and set these diamonds to suit the needs of various industrial operations.

Each representative of Anton Smit & Co., Inc., is fully qualified to study your needs and recommend the diamond or diamond tool most efficiently adapted to your requirements. His guidance is far more valuable to you than "savings" offered by unknown vendors selling "bargain" diamonds. An ASCO Diamond Tool pays for itself in a very short time.

Anton Smit & Co., Inc., brings you the established reputation of over 30 years' specialization in industrial diamonds and diamond tools.

WRITE FOR DETAILED LITERATURE.

ASCO
**DIAMOND
TOOLS**

ANTON SMIT & CO., INC.

Leonard J. A. Smit, Managing Director

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CANADA

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Toronto Sales Office: 180 Adelaide St. West

Salvage those wasted man-hours *with* **WALKER-TURNER 20" POWER FEED DRILL PRESS**

In production drilling, the hand that presses this feed lever represents wasted man-power. For it could be doing more useful work. And the feeding could be done more effectively, with less fatigue and for less cost with a simple, clutch operated worm and gear power-feed mechanism. The new Walker-Turner 20" Power-Feed Drill Press makes this possible in a high grade, accurate machine that sells for as little as \$255. These drill presses are available for quick shipment to plants engaged in war production.

Write for literature and prices:
WALKER-TURNER COMPANY, Inc.
 17103 Berckman Street . . . Plainfield, N. J.

SPECIFICATIONS

CAPACITY: Drills to center of 20" circle.
Feed 8". Drills up to 1" in cast iron, $\frac{1}{8}"$ in steel. Feeding speeds, .003", .006", .009", .012" per spindle revolution. Spindle speeds, 260-5200 r.p.m.

One piece head casting, line bored. Ten spline spindle, with four precision ball bearings. Pulley mounted between two ball bearings to prevent whip. One shot lubrication. No. 2 Morse Taper. Many other features.



MACHINE TOOLS

DRILL PRESSES — HAND AND POWER FEED • RADIAL DRILLS
 METAL-CUTTING BAND SAWS • POLISHING LATHES • FLEXIBLE SHAFT MACHINES
 RADIAL CUT-OFF MACHINES FOR METAL • MOTORS • BELT & DISC SURFACERS

TESTED BY UNDERWRITERS' LABORATORIES, INC.
motor for use in . . .

MAGNESIUM DUST

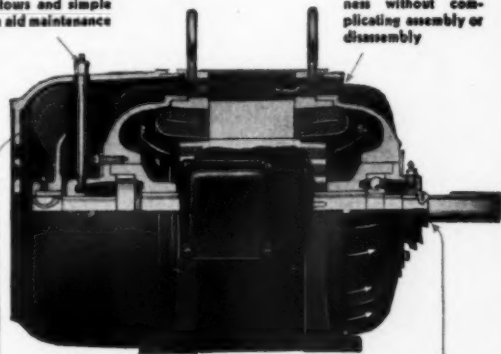
HERE'S a totally enclosed motor specifically approved for service in the presence of magnesium dust (the metal of which incendiaries are made), as well as in aluminum powder and other combustible metal dusts. It fills a critical need of metal-working and ordnance plants, wherever combustible metals are being handled in powder form, and where machining, grinding, or polishing operations are being performed. It's another **FIRST** among G-E motors for hazardous locations. *General Electric Company, Schenectady, N. Y.*

Also ALUMINUM
and other combustible
metal dusts

Typical Class II, Group E, motor now
available in sizes up to 125 hp

Pressure-relief lubrication,
smooth contours and simple
construction aid maintenance

Tight joints, accurate
fits mean dust-tight-
ness without com-
plicating assembly or
disassembly



Effective cooling is obtained
even under a blanket of dust

Labyrinth seal and complete
cast-iron bearing enclosure
exclude dust for continuous
operation

DUST . . . ACETONE
DUST . . . GASOLINE . . .
DUST . . . GRAIN DUST
Name your hazard—
Your family can meet it.

A single enclosed or ex-
losion-proof motor is
recommended for all types
of hazardous service. Gen-
eral Electric has pioneered
in producing a family of
motors to meet the dan-
gers of specific gases,
vapors, liquids, and dusts.
Our engineering staff can
help you pick the right
motor, and advise on the
use of overload relays and
other installation factors
for full-scale protection.

BUILDER OF **TRI/CLAD** MOTORS

GENERAL ELECTRIC

The fundamental basis of all war production is precision and rapidity.

Substitute your flush pin gauges, snap height gauges, etc., for special dial indicator gauges. They are many times faster in operation, no mistakes in reading, never wear out.

We will design special dial indicator gauges to meet your requirements.

TRITON PRECISION CORPORATION

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New York, New York

MANUFACTURERS OF

Special Dial Indicator Gauges,

Special Tools, Plug Gauges,

Ring Gauges, Snap Gauges

and Special Gauges.

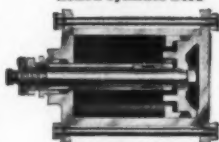
PROMPT DELIVERIES

AIR CYLINDERS

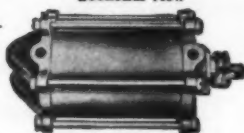
**BUILT TO
STAY ON THE JOB**



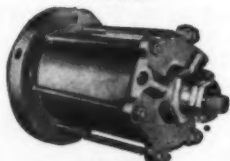
16 in. x 7 ft.
honed cylinder bore



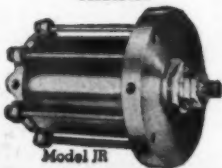
Sectional View



Model BR



Model HR



Model JR

Hannifin cylinders combine precision construction and simple outside adjustment of piston packing—two features that mean greatest useful work from air power, and uninterrupted production. All sizes are bored and then honed, producing a cylinder bore that is straight, round, and perfectly finished. Correct adjustment of the soft, graphite treated piston packing is easily made from outside the cylinder. The efficient piston seal can be maintained throughout the entire life of the piston packing. Full use can be made of air power, without leakage, with minimum friction loss, and simplest maintenance. The piston can be repacked if necessary with standard graphited packing, always available. No special parts are needed.

Hannifin pneumatic cylinders are built in a full range of standard mounting types, sizes 1 to 12 inch diameter, for any length stroke. Both single and double acting types, with or without cushion. Special cylinders built to order. Write for cylinder Bulletin 57-H giving complete specifications.

HANNIFIN MANUFACTURING COMPANY
621-631 South Kolmar Avenue • Chicago, Illinois

HANNIFIN PNEUMATIC CYLINDERS

The WYCO Line



The WYCO Innerliner is the Thing!

WYCO Flexible Shafts have many refinements—are standardized units with interchangeable parts and fittings, have balanced (hexagonal, not half-round) driving ends made of heat treated chrome nickel steel and cores of the finest music wires.

But, of all improvements, the greatest advance in Flexible Shaft engineering is the patented WYCO Non-Metallic Innerliner of graphite impregnated vulcanized fibre that prevents both wear and crystallization of the core, delivers more power to the point of work, makes shafts run true, eliminates chatter and adds years to the life of the shaft.

Quantity production permits lower prices. We guarantee quality.

Immediate delivery on high priority orders.

Write
for
Catalog

The greatest advance in Flexible Shaft Design has been the Patented WYCO Non - Metallic Innerliner

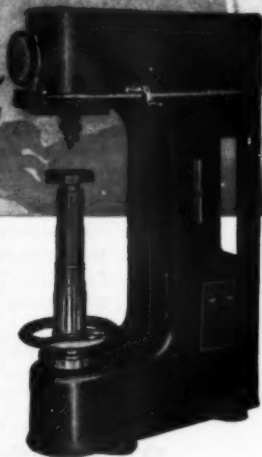


WYZENBEEK & STAFF, Inc.

"The Flexible Shaft People"

834-844 W. Hubbard St.,

Chicago, U. S. A.



A precision built instrument for testing the hardness of hardened and soft steel, non-ferrous metals and metal alloys, by penetration; calibrated on the major load of 150 Kg. which consists of three calibrated weights (60 Kg, 40 Kg, and 50 Kg) and on the minor load of 10 Kg, thus being able to make either direct or conversion hardness readings.

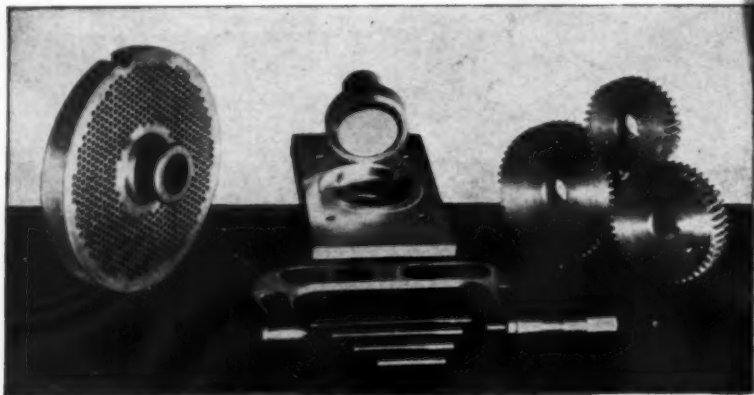
INCLUDED WITH EACH INSTRUMENT:

Diamond Penetrator	Checking Anvil
1/16" Ball Penetrator	3 1/2" Anvil
1/8" Ball Penetrator	"V" Anvil
Metal Dust Cover	Adjustable Steady Rest

Leather Cover for Instrument
 Telescoping Cover for Elevating Screw
 Oil Reservoir for Elevating Screw

Immediate deliveries available with priority certificate.

CLARK INSTRUMENT, INC.
 10202 FORD ROAD • DEARBORN, MICHIGAN.



WHY TRUFORM IS IMPORTANT *today*

Truform Non-Shrinkable Die Steel, for use in applications where extreme accuracy is essential, has the ability to retain its shape, which eliminates expensive replacement of dies and tools ruined by distortion during heat treatment. It can be used to advantage by both inexperienced men as well as by veterans of the industry.

TRUFORM has 4 outstanding characteristics:

1. Non-shrinkable
2. Greater Hardness
3. Exceptional Toughness
4. Machinability

Write for a copy of our new booklet listing applications and working data. Use of Truform results in longer die life and minimum press shut-down time; both factors being essential to production speed-up and war-time conservation of steel and machines and man hours.

JESSOP STEEL COMPANY

Washington, Penna., U. S. A.

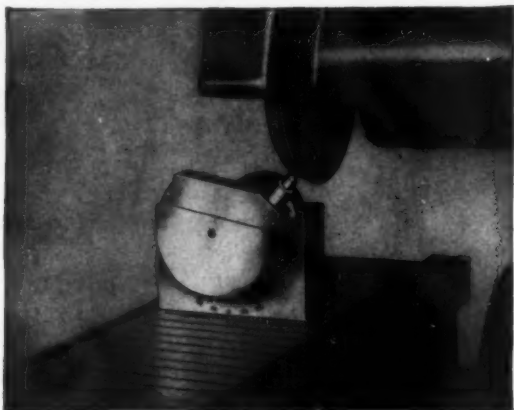


JESSOP STEELS FOR AMERICA AND HER ALLIES

CARBON · HIGH SPEED · SPECIAL ALLOY · STAINLESS · COMPOSITE STEELS

Welch

QUICK ANGLE DRESSER



As suggested by its name, the Welch Quick Angle Dresser can be set quickly for dressing the grinding wheel to any desired angle. It is small, compact, durable; simple in design and construction. All surfaces are hardened and ground. Furnished in plain or Vernier type. Plain dresser graduated in degrees . . . Vernier reads in degrees and minutes. The Vernier being an integral part of the base block eliminates any possibility of error. 10 DAYS FREE TRIAL IF DESIRED.

PLAIN TYPE \$70 NET

VERNIER TYPE \$82.50 NET

One Diamond is Furnished with Each Dresser

Write for particulars.

**ITS
ADVANCED
FEATURES
APPEAL TO
ENGINEERS
AND OPERATORS**

Welch INDUSTRIES, INCORPORATED
Makers of High Speed Milling Cutters—Form Tools and Special Tools
20000 WEST EIGHT MILE RD. DETROIT, MICHIGAN

THIS HONEYCOMB BASE
IS THE PATTERN OF
PRECISION
IN MEEHANITE METAL



SURFACE PLATES

Every factor contributing to accuracy has been incorporated into these surface plates. They are up to one-third heavier than any of the quality surface plates. The honeycomb design base distributes this weight evenly over the entire surface. Hand scraped to extremely close tolerances, of uniform texture, fine close grain, unusual strength and solidarity.

SIZES	APPROX. WEIGHT	HEIGHT	TOLERANCE	NET PRICES
6 x 6	11 LBS.	2 1/2"	.0001"	\$ 19.00
8 x 12	26 "	3 1/2"	.0001"	34.00
9 x 12	40 "	3 1/2"	.0001"	35.00
12 x 12	52 "	4"	.0001"	43.00
12 x 18	95 "	4"	.0001"	68.00
18 x 18	130 "	4 1/4"	.0001"	98.00
18 x 24	200 "	4 1/4"	.0001"	133.00
18 x 36	310 "	6 1/4"	.0002"	174.00
20 x 30	325 "	5 1/4"	.00025"	190.50
24 x 24	280 "	5"	.00025"	180.00
24 x 36	475 "	7"	.00025"	275.00
30 x 36	510 "	7"	.00025"	345.00
30 x 60	1425 "	10"	.00025"	596.50
31 x 78	2100 "	10"	.001"	827.00

Other sizes to specification. Angle plates and straight edges of Meehanite metal also available. Good deliveries on most sizes. Write for folder.

Just off the press—Precision Production Tool Catalog No. 42

ACME TOOL COMPANY

200 CHURCH ST.
NEW YORK, N. Y.

49 days

FROM

IDEA

TO

PLANT OPERATION



**SPECIALLY DESIGNED
AND BUILT FOR WAR
PLANT HEAT-TREATING
— IN JUST 49 DAYS!**

JOHNSON
FURNACES for
INDUSTRY
FOR MORE THAN 40 YEARS

**2 WEEKS
DELIVERY**

on standard Johnson units carrying A1-J priority rating or better.

When you want specially designed furnaces for a specific job, AND WANT THEM IN A HURRY, call on JOHNSON. The above large heat-treating furnace was built and in operation in 49 days, for constant use at 2000°F. in an aircraft plant. Inside measurements of combustion chamber—36" wide, 30" high, 60" long; lined with 5½" insulation, faced with 4½" insulating refractory. Extra features include motor-operated door, push-button lighting and automatic temperature control.

SALES OFFICES:
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120 Liberty St., New York,
N. Y.

C. B. Babcock Co.,
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Whatever your heat-treating problems, let Johnson engineers solve them for you quickly. Call us NOW.

JOHNSON GAS APPLIANCE CO.
554 E Ave. NW., **Cedar Rapids, Iowa.**

New!

The
Only Drill
with a
Metered Feed

It Drills a Perfectly Smooth Bottom Surface



Capacity:
From No. 68 Drill to
 $\frac{3}{8}$ " in Steel.

Depth Tolerance
of .002

At last! A drill-head that will drill, ream or counter-bore to a predetermined depth and produce a perfectly smooth surface at the bottom of the hole—leaving no burrs or marks where the drill or boring tool leaves the metal. Unlike other drill-heads, the Sensaumatic is so designed that the drill,

instead of being released immediately upon reaching the bottom of the hole, makes several additional revolutions without any forward movement, thus insuring an absolutely smooth bottom surface.

MICHIGAN INDUSTRIAL SALES CO.
130 DUFFIELD

DETROIT, MICH.

WRITE
FOR
LITERATURE

SENSAUMATIC DRILL HEAD

PATENT APPLIED FOR



New Target for Industry:
More Dollars per Man per Month in the
PAY-ROLL WAR SAVINGS PLAN



TO WIN THIS WAR, more and more billions are needed and needed fast—AT LEAST A BILLION DOLLARS A MONTH IN WAR BOND SALES ALONE!

This means a *minimum* of 10 percent of the gross pay roll invested in War Bonds in every plant, office, firm, and factory in the land.

Best and quickest way to raise this money—AND at the same time to “brake” inflation—is by stepping up the Pay-Roll War Savings Plan, having every company offer every worker the chance to buy MORE BONDS.

If your firm *has* already installed the Plan, *now is the time—*

1. To secure wider employee participation.
2. To encourage employees to increase the amount of their allotments for Bonds, to an average of at least 10 percent of earnings.

If your firm *has not* already installed the Pay-Roll War Savings Plan, *now is the time to do so.* For full details, plus samples of result-getting literature and promotional helps, write, wire, or phone: War Savings Staff, Section E, Treasury Department, 709 Twelfth Street NW., Washington, D. C.



U. S. War Savings Bonds

This Space is a Contribution to Victory by
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The Knurled Heads

The *knurling* prevents slipping and lost motion so the fingers—handiest of all wrenches—can be used to best advantage. This soon amounts to an **IMPORTANT TIME-SAVING**. The knurling also permits

locking the screw after countersinking. "UNBRAKO" Cap Screws have unbelievable strength—are absolutely accurate. Sizes from No. 4 to 1½" diameter. Deliveries are better than average—and it costs nothing extra to have.

Reg. U. S. Pat. Off.



KNURLED SOCKET HEAD CAP SCREWS

Write for Catalog of "UNBRAKO" Screw Products—now.

Knurling of Socket Screws originated with "UNBRAKO" years ago.



STANDARD PRESSED STEEL CO.

JENKINTOWN, PENNA. BOX 606

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For maximum range in ACTION

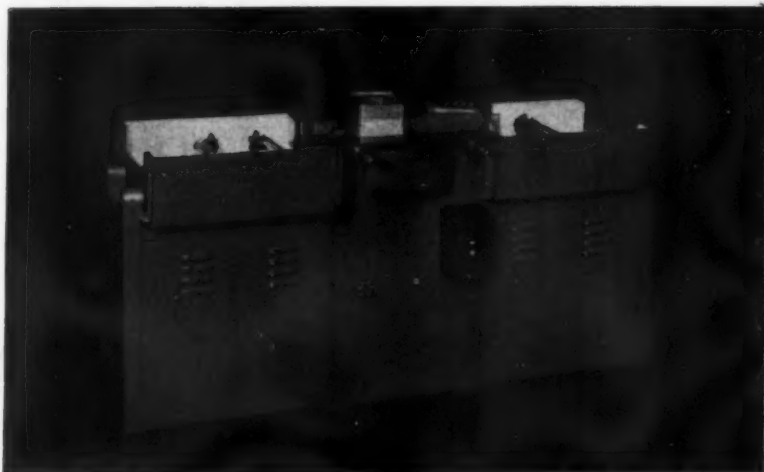


For maximum range in action, ACCURACY is of extreme importance. The reputation of WINTER TAPS was built on their long range PERFORMANCE.

A Division of
THE NATIONAL TWIST DRILL & TOOL COMPANY.
Detroit, Michigan.

Winter Brothers
COMPANY
Wrentham, Massachusetts, U.S.A.





THIS IS A **FIGHTING MACHINE**

It is a heavy-duty, high-speed, disc-type Wet Surface Grinder. 5 H.P. motor; 16" abrasive wheel; gear-type coolant pump. NEW adjustable work guide rollers that make light work of even the heaviest motor blocks. It is the ideal machine for salvaging worn, warped, or distorted heads, blocks, and manifolds—profitably! Equally efficient on production runs of sub-contract war work.

Price \$900

Prompt Delivery!

SEE ONE WORK - MAIL COUPON

LEMPCO

PRODUCTS, INC.
BEDFORD · OHIO · U.S.A.
ESTABLISHED 1919

Lempco, Dept. BB, Bedford, Ohio
GENTLEMEN: Tell me shop nearest me
where I may see a LEMPCO Grinder in
operation.

NAME

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PROMPT DELIVERIES!



A FEW GOOD
DEALER FRAN-
CHISES STILL
AVAILABLE; IN-
QUIRIES IN-
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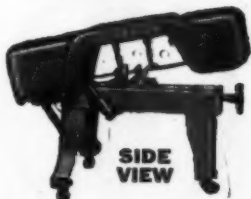
Capacity 10"x18"
Hydraulic Control
4 Cutting Speeds

1/4 H. P. MOTOR
BUILT INTO
FRAME

JOHNSON METAL CUT-OFF BAND SAW

✓ SPEED ✓ ACCURACY ✓ EFFICIENCY

Plant production men working on "impossible" completion schedules know and appreciate the Johnson Saw. Set-ups require only a minute or two, cutting action is fast and continuous. Unlimited adaptability and flexibility for handling almost all kinds of cutting. 3-point base makes special flooring unnecessary.



JOHNSON MANUFACTURING CORP.
ALBION MICHIGAN

Write today for descriptive folder to:

Sales office: 5000-04 CHRYSLER BLDG., NEW YORK

Here's How to Get More Efficient Tapping at Lower Cost



The exclusive advanced design of the new Proconier Tapping Heads assures you accurate tapping at high speeds, with automatic protection for taps! Tap is driven by a double-cone, cork-faced friction clutch which automatically regulates tap driving power by pressure applied through the drill press spindle. Operators can quickly detect dull or loaded taps by the "feel," or pressure on the clutch, required to drive them thus avoiding needless tap breakage. With this sensitive Proconier smooth-operating friction clutch, bottom tapping is as simple as through tapping, since the clutch instantly slips should the tap strike bottom or stick due to the tap loading.

External Threading

Standard Proconier Tapping Heads can be equipped for external threading. Produce accurate work and increase output.

SEND FOR BULLETIN giving full details, description and prices on complete line of Proconier Precision Tapping Heads to meet all needs. The new Tru-Grip Tap Holder—and also the full line of Proconier Universal Tapping Machines, hand or foot operated.



Cross section of Tru-Grip Tap Holder showing positive drive to tap.

Proconier Safety Chuck Co.
14 S. Clinton St.
Chicago, Illinois

Send me bulletins on: ☐ High Speed Tapping Heads
☐ Tru-Grip Tap Holders ☐ Universal Tapping Machines

Name

Address

City State

PROCUNIER

SAFETY CHUCK CO.
14 S. CLINTON ST.
CHICAGO, ILLINOIS

**THIS TOO, IS A BATTLE FLAG....A CITATION
TO 600 WORKERS FOR HELPING INDUSTRY TO
"Make the most of what you have"**



BECAUSE it is an example of what can be done with what you have—of making the most out of all available production facilities—the Army-Navy Production Award to the 600 employees of the Simmons Machine Tool Corporation, "for high achievement in the production of war equipment," can be an inspiration to everyone on the industrial and home fronts.

Simmons did not wait for new equipment before getting squarely behind the Defense

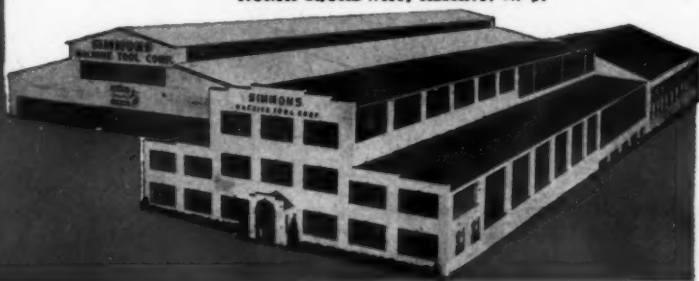
Program, Lend-Lease and America's own War Effort. Its employees never worried about the age of a machine tool or whether a textbook editor would consider it "obsolete."

With machine tools ninety-nine per cent of which had been in use for ten years or more, they have been helping to supply the American Arsenal by rebuilding all types of metal-working equipment and building new lathes, boring mills and planers.

This recognition of their efforts in the award of the Battle Flag of Production is an incentive to all Simmons employees and a challenge to continue to "Keep 'Em Running!"

SIMMONS MACHINE TOOL CORP.

NORTH BROADWAY, ALBANY, N. Y.



OUR JOB

is *Making Broaches*



**—and we have the men
and machines to meet
your exact requirements**

All we do here at Detroit Broach Company is make broaches and broach fixtures—nothing else.

But that's plenty. It keeps us busy day and night. And in the last few months, we have had to add dozens of new machines to our broach-making equipment.

Today we are one of the largest producers of broaching tools in the country ... proof that we have the "know-how" of broach manufacture ... and that we have the facilities to do a job for you.



DETROIT BROACH COMPANY

20201 SHERWOOD AVENUE

DETROIT, MICHIGAN

I'm on my way
SOONER—

because



TRU-LINE TOOLS dress centerless grinding wheels with amazing speed and accuracy!

Shot, shell and projectile forms are rolling off production lines much faster these days, because Tru-Line Tools eliminate all the defects and delays incidental to using single diamond wheel dressing tools.

Once positioned to the wheel the Tru-Line Tool needs no resetting, no turning and no changing until the diamonds are completely used.

The desired wheel form is easily obtained with absolute accuracy and, because every dressing is right the first

time, there is great saving in downtime. The wheel is cleaner and freer-cutting and produces many more uniform pieces between grindings.

Savings in wheel cost may be 50% because fewer dressings are needed and fewer passes per dressing.

Tru-Line Tools are available for fast production of all shot, shell, and projectile forms that are centerless ground.

Send for illustrated folder describing the revolutionary, patented Tru-Line Principle, and engineering data sheets.

COVERED BY U. S. and FOREIGN PATENTS



WHEEL TRUEING TOOL COMPANY

16 W. Davison

DETROIT

Established 1910

HOW TO SEE ERRORS IN DIMENSIONS.

To see errors in dimensions as small as only .0001" or even as large as .002" by depending upon one's sense of touch alone is leaving a great deal to chance. Sense of touch cannot be magnified but vision can be magnified so that we can see errors quickly and accurately.

Visual or Dial Indicator Type Gages enable you to inspect several dimensions simultaneously and to determine the relationship of dimensions with each other. Here concentricity of the outside diameter is checked with the inside diameter. The lower indicator checks the squareness of the end with the axis of the inside diameter and the latter is checked for its own accuracy of diameter, roundness and taper. Try to do this with a "fixed" gage.



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UNIVERSAL CUTTER AND TOOL GRINDER



The Grand Rapids No. 1 $\frac{1}{2}$ Universal Grinder has been designed and built to meet the demand for a high grade machine of medium capacity selling at a moderate price. This machine can be operated from the front or rear. Transverse, vertical and longitudinal movement can be made from either position.

Both vertical and cross movements are provided by means of an "Acme" thread in a bronze nut of liberal size. Both are fitted with graduated dials reading in thousandths of an inch. Sturdy, rigid of design it insures a freedom from vibration and guarantees the ability to produce accurately ground tools.

A powerful I. H. P. motor built into the base provides spindle speeds up to 3450 R. P. M. Universal type head stock with swivel base graduated in degrees so that an angular setting can be arranged.

Write for descriptive folder

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GRAND RAPIDS, MICH.

BE *Wise* WHEN YOU MOTORIZE

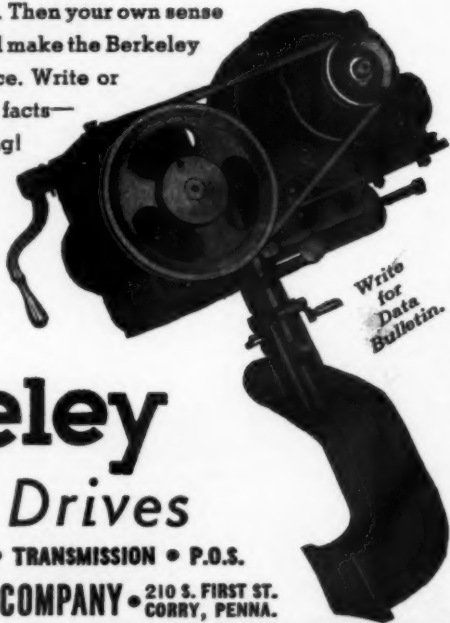
● Get all the benefits that a correctly engineered job can bring you—*maximum* output, not just more output; and the *simplest* installation, not just an easy one.

Every Berkeley Drive is individually engineered to meet the precise requirements of the machine tool for which it is made. For that reason it permits the higher speeds and heavier cuts demanded today.

Compare the Berkeley for strength, simplicity, easy control, power saving, higher operator efficiency and all 'round trouble-proofness. Then your own sense of sound engineering will make the Berkeley Drive a natural preference. Write or wire for the production facts—they're mighty convincing!

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Lathes—Shapers—
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Punch or Drill Presses—Grinders
of All Types—Any Machine Tool



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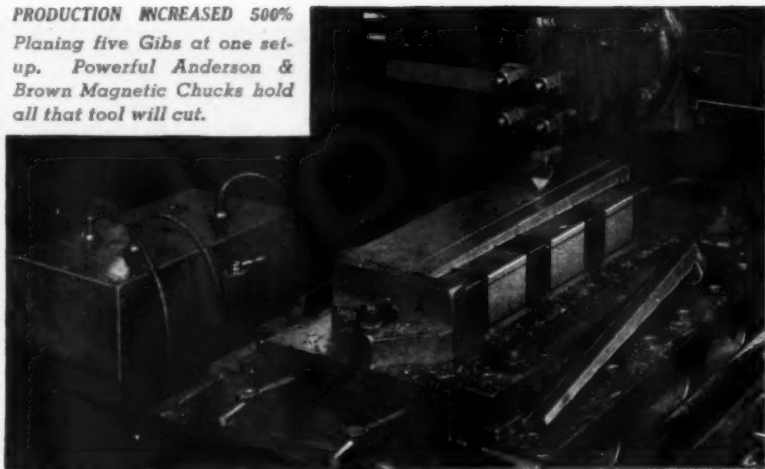
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Planing five Gibs at one set-up. Powerful Anderson & Brown Magnetic Chucks hold all that tool will cut.



NOW— Super-Power Magnetic Chucks for Your Shapers and Planers!

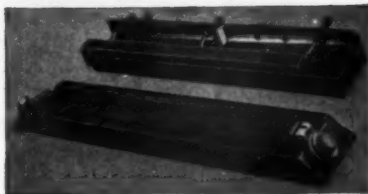
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The above jigs and several operations were eliminated from the job illustrated at top of page. Why not save the cost of fixtures and speed up your production with **ANDERSON & BROWN Magnetic Chucks?**

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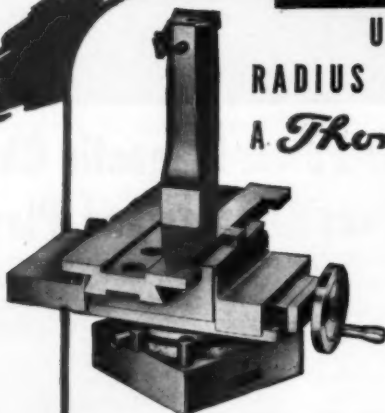


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TO SPEED

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RADIUS GRINDING DRESSER
A *Thompson* PRODUCT



This Dresser will dress a radius on wheel either concave or convex from thousandths to 4 inches and do so accurately and efficiently.

The Dresser is set by gauge block eliminating any guess work.

It will also dress any angles require on a wheel.

Also can be set for a radius and any without changing the set up.



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Spring TOOL HOLDERS



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Spring feature makes possible faster feed with a heavier cut. Cutters outlast 3 to 4 used in a solid holder. One grind only sharpens cutter.

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Threads close to shoulder. Produces smooth, accurate threads. No fitting to gauge when grinding. No adjustment in tool post after grinding.

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Assures faster, smoother machining, free from cutter marks. Ratchet design prevents cutter from turning under heavy feeds. Key in bottom of holder prevents side sway.

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NO BREAKING OF CUTTERS

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OTC GIANT SLUGGING WRENCHES
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OTC Heavy Duty BOX WRENCHES
24 sizes - $\frac{7}{8}$ " to $3\frac{1}{8}$ "

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Saw-way MULTI-PURPOSE **INTERNAL GRINDER**



Headstock moved back and at angle position for grinding tapered hole.

Looking down on top of machine from grinding spindle end.

Offers greater flexibility . . . a precision grinder, designed and built by engineers with years of practical experience to guide them . . . has a headstock traverse of 6" . . . grinds holes $\frac{1}{4}$ " to 18" in diameter . . . holes up to 9" deep, straight or tapered . . . entire headstock may be moved at right angle to wheel traverse, by merely loosening two conveniently located nuts . . . worm compensating device permits grinding wheel head adjustment to .0001 . . . sturdy construction throughout . . . full specifications, delivery time and price on request.

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For War production, America's metal-working plants require thoroughly reliable tool and work holding equipment. The choice invariably is for a Jacobs Chuck, as typically illustrated by this drilling job on a jig for a Douglas aircraft nacelle assembly.



**IF IT'S A JACOBS—
IT HOLDS!**



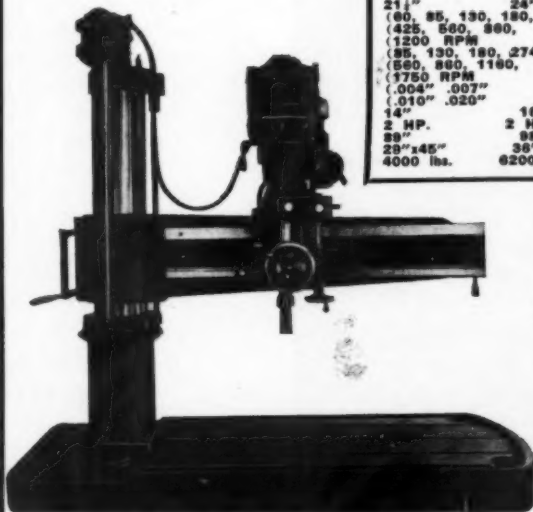
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Hartford, Conn., U. S. A.

JACOBS CHUCKS

The National Standard
for Victory!

CANEDY-OTTO RADIAL DRILLS

**USED
THE
WORLD
OVER**



SPECIFICATIONS:

Drills to the center of circle on base or table
Length of arm
Greatest distance from spindle to base
Minimum distance from spindle to base
Minimum distance from spindle to column
Traverse of spindle
Hole in spindle—Morse Taper
Diameter of spindle at nose
Traverse of head on arm
Traverse of arm on column
Spindle speeds with 1200 RPM motor

Spindle speeds with 1800 RPM motor

Feeds per revolution of spindle

Bearing of arm on column
Size of main driving motor
Height of drill column over gears
Working Surface of Base
Net weight

9" Column 3' Arm	11" Column 4' Arm	11" Column 5' Arm
73 1/2"	98"	120"
3"	4"	5"
43 1/2"	48"	48"
9 1/2"	15"	17"
10 1/2"	10"	10"
9 1/2"	9 1/2"	9 1/2"
No. 4	No. 4	No. 4
2 1/2"	2 1/2"	2 1/2"
25 1/2"	38 1/2"	45 1/2"
21 1/2"	24"	22"
(80, 85, 130, 180, 425, 560, 880, 1200 RPM (85, 130, 180, 274, 560, 880, 1160, 1750 RPM (.004" .007" .010" .020"	on all models	
14"	16"	18"
2 HP.	2 HP.	2 HP.
89"	98"	98"
29"x45"	36"x60"	36"x88"
4000 lbs.	6200 lbs.	7000 lbs.

Canedy-Otto has been the manufacturer of first-class, high-grade drilling units since 1892. These units are available in single spindle, multiple spindle and radial.

We can help you solve your drilling problems. Send for information on our complete line.

Early delivery possible.

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Bryant Hydraulic Internal Grinders are part of the "ground crew" that makes the tremendous fire power of modern military planes possible. Leading aircraft, aircraft engine, and aircraft armament manufacturers appreciate the precision, fine finish, and fast production offered by the Bryant method. That's why, whenever you see an airplane, you see parts that were ground on a Bryant. A post card will bring you the new Bryant Aircraft Catalog. Send for your copy today.

BRYANT CHUCKING GRINDER CO.
SPRINGFIELD, VERMONT, U. S. A.



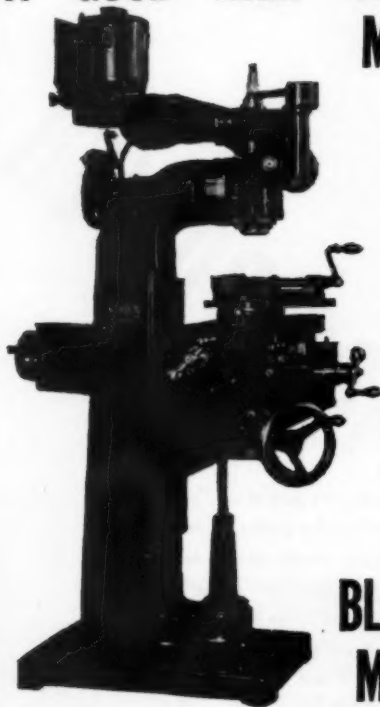
No. 16-C-16 Bryant Internal Grinder



★★ 40-H INDEX ★★

MANUFACTURED BY INDEX MACHINE & TOOL CO.

A GOOD HIGH SPEED VERTICAL MILLER PLUS



It has a spindle running in super precision ball bearings and equipped with No. 9 Brown & Sharpe taper.

It will mill with end mills $\frac{1}{8}$ " to $\frac{5}{8}$ " in tool steel, will bore a 3" hole in steel with a fly cutter and has verniers for locating. Area capacity 8"x16" at one setting.

Users in hundreds of defense plants say it is the outstanding machine of its class.

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MACHINERY CO.**

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National Acme CENTRIFUGE SAVINGS

FIT INTO YOUR WAR PRODUCTION PICTURE, TOO!



Machines take their worst beating when allowed to run with coolants and lubricants containing accumulated grit and other contamination. Merely separating chips and returning the coolant make-up is both unsafe and costly.

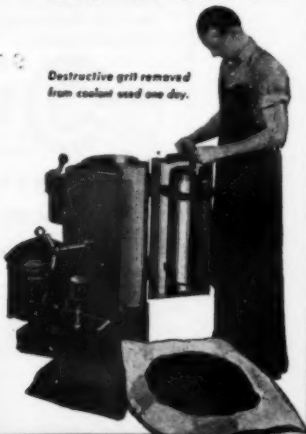
Operation with a National Acme precision built centrifuge removes all the finely divided gritty materials, and tangible savings in any shop are these —

- You grind and replace cutting tools less frequently.
- A higher percentage of your product passes inspection.
- Machine bearings and other operating parts show much slower deterioration.
- You materially reduce both the quantities and costs of coolants and lubricants.

Centrifuge engineers will freely show you the application suited to your shop. Complete Catalog, P-41.

Centrifuge savings are applied to small shops like this and to hundreds of machines of all kinds employing thousands of gallons of coolants.

Destructive grit removed from coolant used one day.



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GRINDERS • SPINDLE GRINDERS • GRINDING AUTOMATICS • FINISH GRINDING AUTOMATICS • AUTOMATIC THREADING GRINDERS •

FOR VICTORY TODAY AND SOUND BUSINESS TOMORROW



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This War Savings Flag which flies today over companies, large and small, all across the land means *business*. It means, first, that 10% of the company's gross pay roll is being invested in War Bonds by the workers voluntarily.

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Think what 10% of the national income, saved in War Bonds now, month after month, can buy when the war ends!

For Victory today *...* and prosperity *tomorrow*, keep the War Bond Pay-Roll Savings Plan rolling in *your* firm! Get that flag flying now! For full details, plus samples of result-getting literature and promotional helps, write or wire: War Savings Staff, Section F, Treasury Department, 709 Twelfth Street NW., Washington, D. C.



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War Savings Bonds

This Space Is a Contribution to America's All-Out War Program by

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Use



WITH Martin Master Collets, the replacement of three small pads gives you the equivalent of a brand new collet. The steel required for these pads is only a fraction of that required for a complete collet . . . representing a definite saving in the vital alloy steels needed for collet manufacture.

Of equal importance is their time-saving feature. The interchangeable pads are removed from the end of the collet while the collet itself remains in operating position in the machine. A complete change of collet size can be made in from five to seven minutes . . . making possible a substantial increase in the number of hours of a machine's productive time.

The pads used in Martin Master Collets are integral parts of the locking wedges which fit tightly into the end of the collet. They will positively not become loose. When it is necessary to change the pads, a few turns of the wedge screws permit quick removal.

Under present conditions, the many advantages of these collets . . . particularly for machines with capacity of 1½" and over . . . should be given real consideration. Write for full details.

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ODERN COLLET and MACHINE CO.

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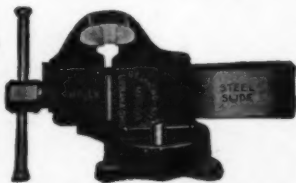
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Ask for copy of our catalog and name of your nearest dealer.

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You Need

True-Cut TOOL BITS

Use Gold Tip and Blue Nose Bits on tough jobs like this and watch results.

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. . . DOVETAILS . . .
FORM GROUND TOOLS

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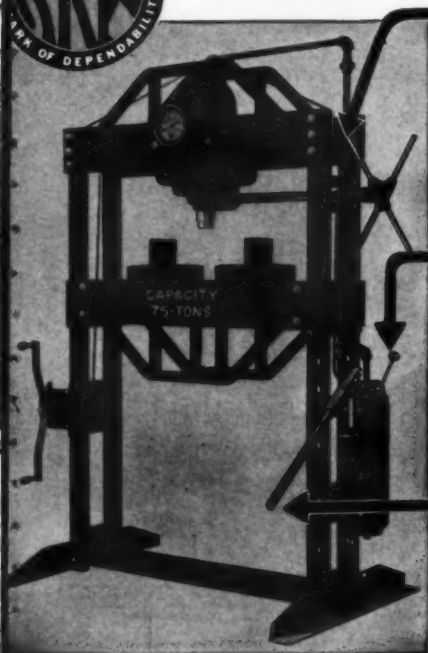
14236 Birwood, Detroit, Mich.

Specially treated to Rockwell "C" 62-65, and are not brittle.

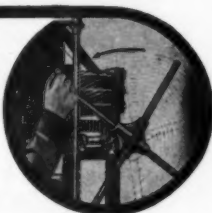


Actual photo of True-Cut Gold Tip Bit.
1 1/16" cut, .080
Feed, 1010 SAE Steel.

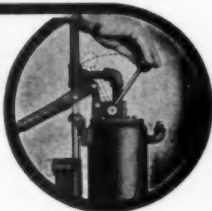
Here's how **SPEED** is built into HYDRAULIC ARBOR PRESSES



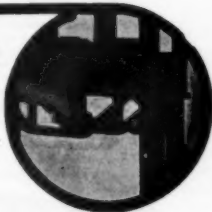
1 SPIN THE HAND-WHEEL and the ram speeds to the work by fast mechanical action instead of slow, laborious hydraulic pumping.



2 FLIP THE BALL ARM to close the valve instead of slowly turning a hand-wheel type control.



3 START PUMPING and immediately get tons of pressure on the work because the hydraulic cylinder was automatically filled with oil during operation No. 1.



• The new KRW Presses are designed for **SPEED...speed** in bringing ram to the work...**speed** in developing hydraulic pressure...**speed** in raising ram to remove the work. The "capstan" type handwheel raises the ram with the same mechanical speed employed in lowering it.

A Two Speed Pump, controlled by a

quick, half turn of a finger lever, enables operator to select the speed best suited to the job—the double plunger action is $2\frac{1}{2}$ times faster than the single action. Write for bulletin describing 25, 50 and 75 ton presses—priced from \$198.00*.

*Prices F. O. B. Aradoa, N. Y. Slightly higher west of Rockies

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Please send Hydraulic Arbor Press
Bulletin No. 27.

Name _____
Address _____
City _____ State _____

Grind Quicker... Grind Smoother ON EVERY WAR-TIME JOB WITH THESE **SKILSAW TOOLS!**

Here are **FIVE** kinds of **SKILSAW TOOLS** you shouldn't be without, if you want to speed your finishing operations, reduce waste and increase your output in war production. Do you have welds to grind down? Stainless steel or brass sheets to polish? Castings to clean? Small machine parts to finish? There's a **SKILSAW TOOL** for each of these operations . . . and the job will get done quicker and better and at lower cost.

These **SKILSAW GRINDERS** and **SANDERS** are typical of the entire line of **SKILSAW TOOLS**—designed to deliver results under today's stepped-up conditions, built to stand hard usage without time-wasting breakdowns. Look into America's busiest war-work plants and you'll see **SKILSAW TOOLS** on the job. Ask your distributor for a demonstration and you'll see why!

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MAKES SMALLER HANDS MORE PRODUCTIVE

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Sanitary stainless steel to a perfect finish is faster with **SKILSAW Disc Sanders**. Disc removes scale, rust, and polishes on flat or curved surfaces.

SKILSAW Belt Sanders speed up all "band finishing" on the surfaces of tanks, brass and all steel parts. Quickly removes paint and rust.

SKILSAW Hand Grinders are smaller, lighter on all grinding of pipe, dies and the precise finishing on machine tools and castings.

Spurred evenly throughout the plant, **SKILSAW Bench Grinders** correct production, keep tools and metal both sharper . . . grind small parts quickly.



DISC SANDERS



BELT SANDERS



HAND GRINDERS



BENCH GRINDERS

EVERY MAN COUNTS FOR MORE
USING SKILSAW TOOLS!

NEW!

SKILSAW PORTABLE GRINDERS

Just introduced to speed up production on every war-time job...grinding down rough welds, removing welding beads, cleaning castings, filing, buffing and polishing on every metal surface. Two Models.

By and large, subcontracting has worked out very well indeed, in the speedy production of war equipment— in spreading the work among plants that might otherwise be idle. Francis A. Westbrook reviews briefly, one of the things that have been done in this field in the story beginning on page71

How smooth is smooth? Walter Melson of the General Engineering Laboratory, General Electric Co., tells how his Company has approached this problem, designating and illustrating fishes thru the medium of actual fish specimens. See page85

Some personnel problems are discussed in Edmund Mottershead's second contribution to The Foremanship Column. This series of articles is based on actual cases presented to Mr. Mottershead and the discussion may help solve similar problems encountered elsewhere. See page99

The War Production Metal Show to be held in Cleveland's Public Auditorium, Oct. 12-16 will provide an opportunity for mass dissemination of information and ideas. It should help solve many perplexing production problems. A brief preview and list of exhibitors is given in the section beginning on page127

Tooling Engineering Data so that it will be readily available when needed—that's the subject of W. C. DeGraff's story. He describes in detail, the system used by Warner & Swasey and his suggestions and ideas that may be used by other Companies in the field beginning on page139

Thousands of women are contributing materially to Britain's mounting production. Increasing numbers of men are entering American war in-

dustries. Dr. J. H. Hazelhurst, Panel Consultant, War Production Board tells some of the things that must be considered in employing women. See page155

Carbides Dies for Tube Drawing is by Earl Glen of Carbology Co., Inc., Detroit. It describes the use of carbide dies and mandrels for increased production of tubing. See page167

In his third contribution on the subject of modern milling practice, John E. Hyler discusses the advantages and uses of carbide tools, on page177

The important subject of manpower for the fighting and production fronts is discussed by Major General Lewis B. Hershey, U.S.A., Director of Selective Service. The procedure for deferment applications is outlined. See page199

With shortages looming on some important items, the subject of conservation deserves serious consideration. Ernest W. Fair gives some timely suggestions for preventing waste on page 205.

Results of a nationwide survey on the subject of using larger electrodes in arc welding show that this will be a decided help in speeding the war effort. A. F. Davis, Vice President, Lincoln Electric Co., Cleveland presents the facts on page209

"Let's Talk Shop" presents a number of helpful suggestions in the section starting on page213

"Tooling Up for Victory" presents the monthly parade of new production tools and equipment in the section starting on page241

Plants for Subcontract work339
Mechanics Through the Ages380

HOW TO GET THE MOST OUT OF YOUR LATHES

No. 2 in a series of suggestions made by the South Bend Lathe Works in the interest of more efficient production.

Keep Them Well Oiled

*For lack of oil the bearing was lost;
For lack of a bearing the tank was lost;
For lack of a tank the battle was lost;
All for the lack of a film of oil.*

Paraphrasing the rhyme about the horseshoe nail, an army officer is said to have used this verse to emphasize the importance of lubrication.

The proper lubrication of lathes and other machine tools will help our war effort by preventing production interruptions, and saving critical materials and labor by reducing the demand for replacement bearings, parts, and machines.

South Bend Lathes, like other fine machine tools, have large oil reservoirs, felt wicks, and oil retainers to guard against lack of oil due to temporary neglect or oversight. But for best results the lathes should be oiled at regular intervals. Even a camel must have an occasional drink.

Make Oiling a Habit

All oil holes and oil cups should be filled at least once a day—oftener when top speeds and feeds are employed. Best practice is to fill each oil hole in a regular sequence so that oiling becomes a habit and no oil holes are overlooked. When the lathe



All bearings should be oiled at regular intervals

is in service on two or more shifts, oiling the lathe should be the first daily task of each operator.

Use Correct Grade of Oil

When the correct grade of oil is used in a well designed bearing there is little or no metal-to-metal contact. However, when the wrong grade of oil is used, or if the oiling is neglected, the oil film will break down and the bearing surface may be damaged, in a short time.

Write for Bulletin No. H2

Bulletin No. H2 giving more complete information on oiling the lathe will be supplied on request. Oil charts for South Bend Lathes (advertising serial number), and reprints of the and other advertisements in this series can also be supplied.



SOUTH BEND LATHE WORKS

Dept. 193

South Bend, Ind., U. S. A.

Lathe Builders for 35 Years

As The Editor Sees It

FEW people have a better understanding of the prewar Jap mentality than former Ambassador Joseph C. Grew.

He has told us that they put great store in what they consider to be the white man's flabbiness. They look upon us as constitutional weaklings, demanding our daily comforts and luxuries—entirely unwilling to make the sacrifices demanded for victory in a war against a military machine which has prepared for many years and trained itself in Spartan simplicity. They are banking on our supposed lack of hardness and toughness demanded by total war.

Well, we do have a lot of soft, selfish, spineless creatures that obstruct and clutter up the war effort. But, thank Heaven, we also have plenty of real Americans.

Wherever the Nips have met a fair sample of the caliber of our fighting men, they've had reason to think that maybe the sneak job at Pearl Harbor wasn't such a bright idea after all.

We've made a good start but it will take a lot more men, planes, ships, tanks, guns and determination to smash the land of the rising sun—and to help make a certain small-time paper hanger regret that he ever gave up that line.

It means continued hard work on the production lines. It means salvaging every available piece of scrap metal and getting it to the mills without delay. It means real conservation of our tires and precious rubber stocks. It means buying war savings bonds and stamps up to our individual limits. It means saving precious minutes on war production jobs so as to deliver **more . . . sooner**. It means being a good sport about rationing and other restrictions and regulations essential for victory.

In short, it means hardening and toughening ourselves and being real 100% Americans.

Wesley G. Paulson



Sub Propeller Shafts Needed Quickly!

Story of How Ryerson Ingenuity Saved Five Weeks

URGENTLY needed at a distant shipyard were fourteen forged submarine propeller shafts that must pass Navy specifications.

Forgings were specified, but none could be secured in time.

Quickly available in Ryerson stocks were cold rolled bars — the right size — but in five different analyses.

Navy Inspectors were skeptical. Could Ryerson heat-treat and assure uniform physicals—also furnish pull tests for each bar? Well, no; because the piece left after the bars were cut to the needed length, would be too short to make a standard 6" test sample. A delay of five weeks loomed ahead. . . .

Then Ryerson metallurgists found a way: Inquiry revealed that the shafts were to be machined down at each end for a distance of 7". So, why not cut a piece from the side of each bar, *before machining*—enough for all tests yet leaving sufficient stock for machining to size? The idea worked perfectly.

The data charts always furnished with Ryerson Certified Steels provided the exact analysis of each bar and assured proper heat-treatment. A few minutes hacksaw work yielded the necessary test samples . . . and all fourteen bars passed the rigid



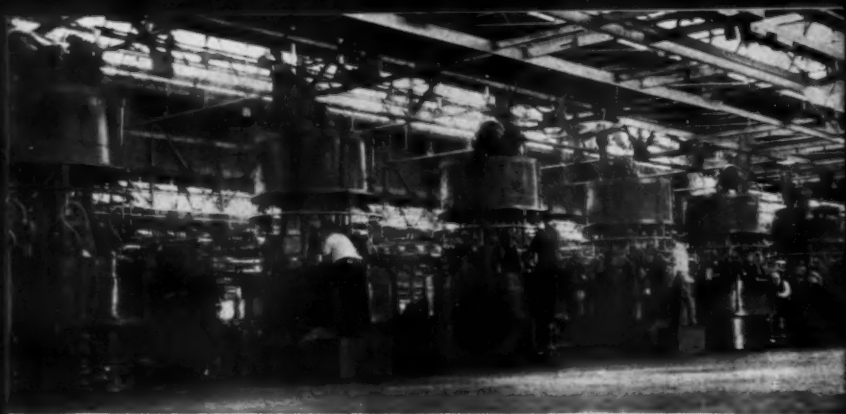
Cutting 6" test pieces from side of bar without affecting length.

Navy Inspection with flying colors.

Ryerson ingenuity has helped many manufacturers in solving production problems—has also cut ultimate delivery time from months to days. Ryerson engineers and metallurgists backed by a century of service to the nation, are ready to work with you in accordance with WPB plan in making the most of all available steel.

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RYERSON STEEL—SERVICE



What About Subcontracting?

By FRANCIS A. WESTBROOK, M. E.

FROM electric razors to spring-clip fasteners and machine gun parts; from boxcars to submarine and tank parts; from electric fans and motors to airplane turrets and control mechanisms—these are but a few of the switchovers, that have been taking place with mounting rapidity, as more and more of America's industrial plants have converted from pursuits of peace to finding their place in war-production. It is famed Yankee ingenuity gone militant, chief headache of the Axis partners. They know too well the might and power represented by American industrial output in the hands of brave soldiery—but they had counted on disunity and delays in getting the production machine rolling.

of American "know-how," adaptability and conversion for all-out victory. For those peacetime plants seeking ways and means of getting into the big fracas via subcontracting, the booklet holds much of value.

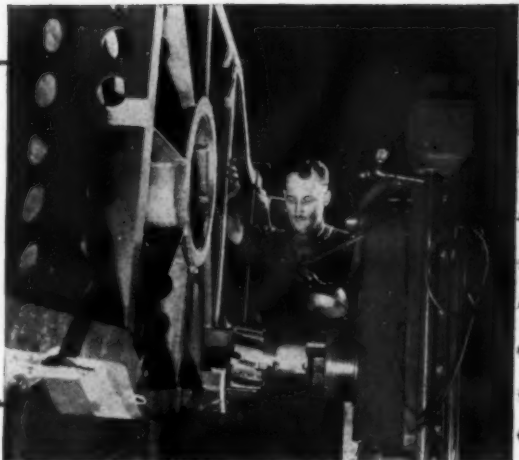
Not all plants have been able to convert, naturally. But there have been many thousands which have made important production switchovers, says the booklet. With some 100,000 parts needed for each Flying Fortress and a billion pieces for the 45,000 tanks to be made, for example, there has been plenty of opportunity for shops of practically all kinds, to play an important role in the vast war production program. This has been especially true in the case of metalworking organiza-

"In factual reports by top-flight newspaper correspondents who toured 64 plants in 20 cities and 13 states, WPB's newly released booklet, "Industry's War Production," gives interesting and dramatic take-offs on the functioning

CARS TO PLANE ENGINES—Converted 100% to airplane engine production, this factory employs thousands of workers who are hitting their stride with the newly installed tools and machines. The workers are rough boring cylinder barrels of airplane engines before heat treatment in view at top of page. (OEM photo).

(Right) One of the many machining operations on a partially assembled carriage for a 37 mm anti-aircraft gun—in a Pennsylvania heavy industry plant converted entirely to war production.

(Below) Closeup of vertical turret lathe operations on an airplane engine crankcase. (OEM photos).



tions, tho by no means has it been confined to that field. Service shops of textile mills have made milling machines and gun parts. Some of the big

tire companies have made gun mounts and so on.

When a former prominent maker of fine hosiery and lingerie can keep his wheels buzzing and help the war by making mosquito-netting for the armed forces, surely, as the Irishman said, there's some chance for you, and you, with plants, skills, experience and personnel for making what not.

How to go about it

The first step is to make a thorough analysis of your total facilities. List your plant equipment, personnel, the skills, functional and managerial, available, together with products you make regularly, or have made otherwise. These should include anything you have made along war production lines, either primarily or as a sub-supplier. With the survey well in order, take your engineer with you to the local WPB field office, Army District Procurement office or that of the Navy Bureau of Supplies. WPB Division of Information has released a booklet of this procedure. It would be well for

you to write it at local or Washington headquarters and get the book, using it as your guide. With your data well organized, you'll get every help and cooperation from these bodies toward enlisting your plant and facilities in the war effort, either as primary or subcontractor. WPB has established field offices in 13 regional areas, grouped about the U. S. Purpose of the offices, according to Donald Nelson, is to effect the closest and most efficient use of facilities within each area. Lists, for the purpose, are maintained, recording all the tools and facilities available in each area for war-production work. Establishments are urged to make known their subcontracting needs to their respective local WPB offices. This publication has helped bring many prime and subcontractors together. Send a list of your machine tools available to Subcontract Dept., Machine Tool Blue Book, 508 South Dearborn St., Chicago. No charge whatever is made for listing your plant facilities.

Aggressiveness helps

While WPB wants to give you every

assistance, it doesn't mean that you need rest your case entirely in their laps. In this big emergency, cooperation is the watchword. Meaning that you needn't let yourself go rusty on aggressive sales effort. As witness the



(Above) Assembling elevating mechanism of a 37 mm anti-aircraft gun carriage in a converted Pennsylvania heavy industry plant.



(Left) This worker in a New England plant that normally produces electric dry shavers is now busy turning out spring collets for machine tools to be used in war production. The machine is a Norton Type C 6" semi-automatic cylindrical grinder with a 3" vitrified aluminum oxide wheel. (OEM Photos).

Each mighty M-4 Tank receives a careful final check before it rolls off the assembly line of an Eastern plant. Official OWI photo by Rittase).



many instances where firms have landed important sub-contracts by the simple means of going after them. There's the story of the New York jeweler who



He ran a lathe in '17 and now he's running one again for Uncle Sam—producing 37 mm gun parts in a former safe and lock factory. (OEM photo by Hollem).

specialized in platinum settings. Facing a shutdown and disemployment of 45 men, he considered going out of business. One of his employees, however, happened to mention the state of affairs to a sister, herself employed by a maker of surgical instruments. She talked to her boss about it, and soon her brother's boss got a contract order from her boss. Now the jeweler is making 9 separate medical items for Army-Navy. The only extra equipment he needed was a small lathe. When one operator called for a special small vise, it was procured from a dime store. Dozens of instances also are on record where some good, hard, sensible community-promotion and pooling of facilities turned the trick for towns which had thought themselves out of the picture, entirely.

Tide Turned

In the earlier days of subcontracting and conversion, when the plan was new and untried, without any definite setup anywhere to guide the way, there were stories of some tough going, to land war work. But the tide has turned. The hunters have become the hunted.

POP'S ON THE WAR-PATH AGAINST WAR-WORK WASTE



INDUSTRIAL man-hours were never more precious; high productive capacity never more urgent than right now. There is still too much waste of tool life through improper use, improper care and improper selection.

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One Chicago firm actively campaigned with ads in newspapers, seeking contacts with any firm—any size—within 300 miles, equipped with any automatic or hand screw machines, capable of producing small parts on war work subcontracts.

Maybe you've held off because your facilities and products are of such nature that they didn't seem to fit into the situation. If such is the case, don't let it deter you. Imperative necessities have brought about such strange combinations of different industries, that you can't know just where you can fit or will fit.

Conversion transformance

Conversion to war production left hundreds of smaller suppliers in unusual situations. Many of the more aggressive, long ago converted to some branch of war work. Thus, a body-builder is now making airplane tail-parts. Presses, formerly used to knock out body parts, needed but an addi-



A grinder in action on a 37 mm gun barrel in a converted Pennsylvania factory. (OEM photo by Hollem).



Arc welding is playing a vital role in our war effort and husky welding positions like this facilitate the work. (Official OWI photo).

tional gear, fitting them to produce parts of lighter-gage metals. The firm's peace-time experience has been carried over to war production with modifications, resulting in doubling production capacity. Many shortcuts have been developed, such as welding instead of riveting. Only short training periods were needed to convert workers to the new setup.

Size of firm is no barrier at all. A 2-man firm in Bay City, Mich., has just been awarded high honors for war production by WPB. It is turning out iron flanges for wooden pipes, made by another firm. Instances, like that of the firm with only 10 machines and a personnel list of 20 men, are by no means rare. The pooling plan makes possible the use of available equipment in an area . . . planers, boring mills, millers, grinders, lathes, etc., without need of new plant construction, retooling and layoffs. One of the biggest assets this plan presents is that work-



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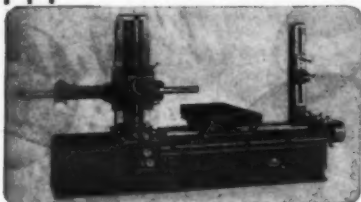
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POWER TOUCH CONTROL...

A convenient central control station. Versatile in its quick starting and stopping, speed adjustment without stopping and correct speed setting.

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The full advantage of a D.C. Drive (from A.C. power source) such as rapid acceleration up to predetermined speed settings, quick shockless stops and starts, infinite speed adjustments.

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Heavy multiple thread gear on the spindle drive eliminates all noise and chatter. All drive shafts, drive and feed gears, are of the best alloy steels obtainable, mounted on anti-friction bearings and provided with oil pump flood lubrication. And many more desirable features! Write for the late bulletin for full description.

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The **YODER** SALES COMPANY
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ers need not be removed from their homes, imposing no added housing problems.

The York Pool

Examples of subcontracting and conversion in achieving America's phenomenal war production can be multiplied infinitely. Among the standouts, however, exemplifying what can be done, given the will and determination to cooperate, is the accomplishment at York, Pa. Due to the aggressiveness of York Safe & Lock Co., the town can be said to be on 100% war-production basis. The firm, long a prominent producer of intricate locking mechanisms and safes, has made vault doors as heavy as 300 tons. In World War I, it had some experience making firing mechanisms for armaments. The town and environs possess, also, many metalworking shops, with employees accustomed to precision work.



This Norton cutter grinder formerly ground cams on shaver motor shafts. It is now grinding permanent magnet rotors. The metal is Alnico and the octagonal shape consists of surfaces which are arcs drawn from the center of the piece. (OEM photo by Hollem).

Don't **BOLT** your
machines to the floor

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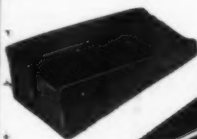
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DELIVERY**

EMPCO Machine Jacks remedy the problem of leveling machines shifted for more efficient plant lay-out. No more cement base and floor bolts with their periodical shimming. Simply place EMPCO Jacks under each machine on your present floor, apply a wrench to the "hex" screw head and presto! . . . a level adjustment as precise as you want.

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These heavy steel hulls and bogie-wheel assemblies in an Eastern plant give some idea of the massive construction of our new land battleships. (Official OWI photo by Rittase).

York Safe & Lock Co. made a list of all these plants and their adaptability to war work. It resulted in the firm's getting a huge war order. This it broke down into some 6000 parts. 45% of the work was farmed-out to nearby shops. Some new machinery was necessarily involved. But every existing machine in the area is utilized as far as practicable.

Some of the adaptations are interesting and stimulating, in their simplicity and effectiveness. A small plant made aluminum floor-waxers. Priorities had him on the ropes, running about 3 days per week. As part of the York pool,

boring gear-housings for anti-tank guns now keeps this plant humming 22 hours daily. The plant had a 5-spindle drill press, formerly used to bore waxer-housings. By installation of a special chuck, the machine is now going great guns. With 5 spindles, it can bore, ream and face. Furthermore the men who formerly assembled waxers, now are doing more precise work. Lathe-operators who formerly worked within .001", now successfully handle tolerances of .0001".

"Do what you can

... with what you have," is the slogan of the York plants. Thus, a peacetime silk weaver is now chipping off surplus metal from axle-housing assemblies. Another installs gear covers. Workers as well as machines have gone all-out for war work, each doing what can be done with available skill and facilities.

Such is the spirit and inspiration in which America girds itself in this great world holocaust . . . a struggle which concerns vitally every American, and in which every American must find his place.

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Portable—move directly to job; a time saver for both small and large shops.

4" stroke; adaptable for other work.

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EVERY TOOL STEEL HAS AN ALTERNATE

..it pays to know them

AS war production rises rapidly toward its peak, the problem of materials becomes more and more insistent.

High Speed Steels furnish one of the best examples, because these special steels depend for their properties on some of the most critical alloying elements in the list. Continuity of supply of High Speed Steel is absolutely essential to continuity of production; yet, under the exigencies of equable distribution, you may encounter a temporary short-

ness of supply in your first-choice cutting steels at any given time.

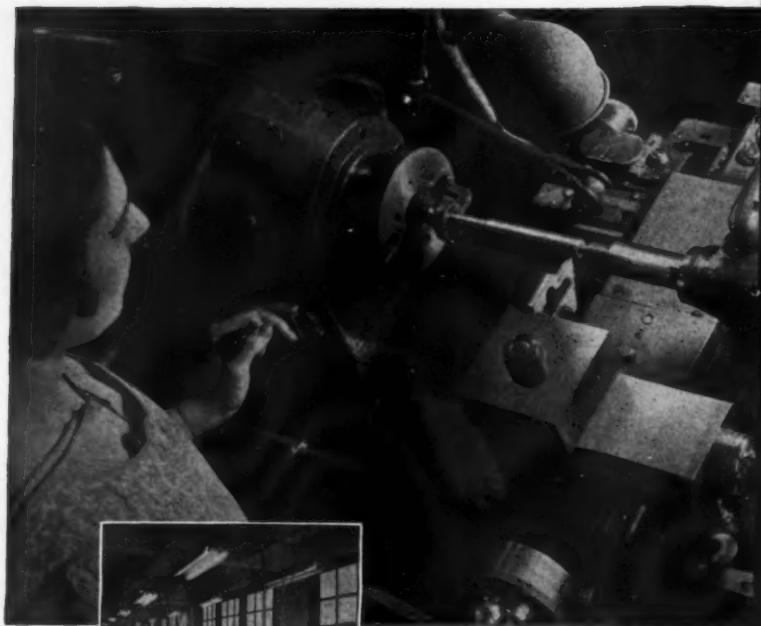
It would be wise to protect yourself against such an eventuality. Take precautions against a loss of production time and volume by learning the *alternate* tool steels for your jobs. Get familiar with them—just what they'll do and how they're handled. Frequently the alternate can step into the job with no loss of performance; in a great many cases, a steel can be found that will out-perform the original.

● But play safe—know the alternate tool steels for the types you customarily use. Our Engineering Staff is at your service.



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FOR HIGH PRECISION WORK

Chasing thread gage laps is one of the most accurate operations in gage work, yet within a few weeks after installing their first machine in this department, The Taft-Peirce Manufacturing Company of Woonsocket, R. I., is operating its entire battery of 16 Monarch Sensitive Precision Lathes with previously untrained help. In spite of this seemingly short training period, production rate is high, accuracy well within required tolerances, and the number of rejects surprisingly low.

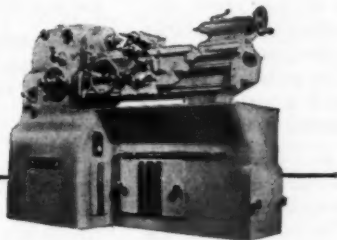
To maintain production, the first Monarchs delivered were manned by experienced workers. One by

one, new operators were carefully trained, and now have released these skilled men for other work.

This is one of many examples which prove the utility of Monarch Lathes. Simple and easy operation allows immediate production of many repetitive jobs by previously unskilled operators. Accuracy is so much a basic part of Monarch Lathe design that neither quality of work nor production rate suffers by such emergency measures.

Further—this is additional proof that even under present production pressure, there is no letdown in Monarch quality.

For thread chasing and heavier turning, Monarch Sensitive Precision Tool Makers' Lathes include a (6 to 1) back-gear unit as an integral part of the drive motor, operated from front of the lathe. This lathe permits bench precision accuracy and is designed for easy and convenient handling of work with less operator fatigue.



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THE FIRST TIME you examine a NUCUT File and recognize its characteristic rows of wavy teeth—the first time you run your fingers over its keen-edged teeth—or, better yet, the first time you put a NUCUT to work, you know that here is a file of extraordinary cutting power.

This is so,—since a NUCUT has *both* coarse teeth and fine teeth, in scientific wavy rows. Because of this patented fea-

ture, it cuts deep, clean, true—and, at the same stroke, levels off smooth. This means faster, better, easier filing. Test this for yourself and see!

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MORE CUTS WITH NUCUTS

Surface Finish Standards

By WALTER MIKELSON*

THERE is widespread need at present for a practical, rapid, and reliable method for designation of machined surface finishes from both the design and production viewpoints. Raw materials and completed products must be manufactured in larger quantities than ever before, with no sacrifice of quality. This turn toward more efficient national production, and toward making the greatest possible use of our present production facilities, means that manufacturers who were heretofore entirely independent, are now co-operating and working together toward the common end of producing satisfactory products in the least possible time. Engineering ideas are exchanged, production facilities are combined, and subcontracting of machined parts is widespread.

Successful completion of a manufactured product having particular surface finish requirements, depends to a considerable extent upon clear understanding of surface finish requirements between manufacturers, and between engineering, designing, and production groups in any one manufacturing plant. An approach to this problem which General Electric Co. has used for the past 10 years, is that of describing these finishes with the aid of actual finish specimens. Not only has this method been found valuable in maintaining quality at low cost in our production equipment in the past, but

now, more than ever, its value has become apparent.

Performance of a machined surface from the finish viewpoint, depends upon dimensional characteristics of surface irregularities. These characteristics can vary considerably and depend both upon the material and upon the method of finishing used. The most important characteristics are:

- (1) Surface roughness.
- (2) Surface waviness.
- (3) Direction of irregularities in the surface plane.
- (4) Pattern of irregularities.
- (5) Surface profile.
- (6) Contact area with mating parts.

As defined by the proposed American standard on Surface Roughness, (1) "surface roughness" is the rms height of the surface irregularities whose peaks are closer together than $1/32"$; and "surface waviness" is the height of deviations whose peaks are farther apart than $1/32"$. The other terms are believed to be self-explanatory.

Instruments are now available which can be used to measure some of these characteristics and they should aid materially in obtaining much needed data on surfaces and their behavior. Of these, the most widely used are stylus

*General Engineering Laboratory,
General Electric Company

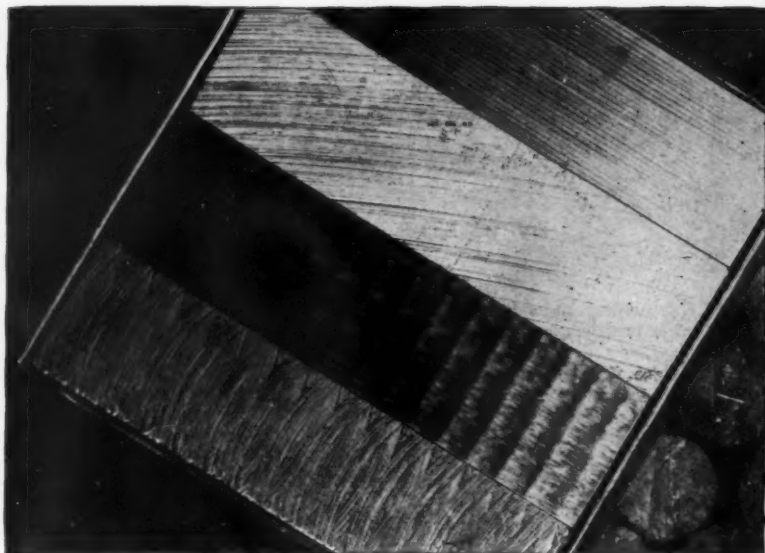


Fig. 1—Surfaces of 4 sample blocks of 18-8 Chrome Nickel Steel having the same order of magnitude of over-all RMS roughness.

or needle-type instruments which measure surface roughness as defined above. Although these instruments have proved themselves valuable when properly used, their use in production has in some cases led to the misconception that surface finish and surface roughness are synonymous.

Performance of a surface, however, depends not only on the roughness but to some extent on each of the several dimensional characteristics mentioned which describe the finish. The relative importance of each is dependent to a large degree on the use to be made of the surface.

Although little quantitative data are available and much more research work must be done on the effect of different finishes on performance, significant results have been obtained by a few experiments in the field. Day-

ton, Nelson, and Milligan (2) have obtained results on bearing performance of journals varying in roughness from 1 to 10 microinches, and these investigators observed no consistent correlation between performance and roughness.

Schurig (3) reported tests where a grit-blasted journal was compared with a polished and ground journal of one-third the roughness. When tested in an Almen machine, the grit-blasted journal was found to take three times the load of the ground specimen without seizing. Schurig also describes oil-lubricated bearing surfaces, dry rubbing surfaces such as collector rings on electric generators, stationary contact surfaces, and joints in which the various dimensional characteristics of a surface assume different degrees of importance.



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The No. 40 Knight Miller by performing these 5 operations at one setting, saves precious hours of down-time on many jobs. In addition, the special swivel and tilting table features save the use of many angle plates and cutters, and special fixtures. Still more time is saved.

The No. 40 Knight Miller has a wide range of capacity, fitting it for many jobs and uses. There are 16 different spindle speeds ranging from 40 to 1400 r.p.m., with reverse provided. 16 table speeds range from $\frac{1}{2}$ — $12\frac{3}{4}$ ".

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Tests made by Shaw (4) suggest that a smooth surface is not always better than a rough one. This conclusion is based on load-carrying tests of metal-sprayed steel shafts having a porous surface compared with hardened steel shafts.

Wulff (5) points out that surfaces of the same material, finished by different methods but all measuring two micro-inches root-mean-square roughness, sometimes behave differently with respect to strength, friction, corrosion, and erosion. The susceptibility of material to fatigue failure is likewise considerably affected by many of the characteristics of the surface finish.

Practical instruments are not yet available which adequately measure all dimensional characteristics of a surface. More research work remains to be done before the importance of these characteristics to the performance of surfaces can be evaluated. In the meantime, some simple, practical method is needed to specify surfaces in design and production in a way which takes into account as many of the characteristics of the surface finish.

The G-E system makes use of sample gage specimens. In many respects it is similar to the system that has been

announced by the Army Ordnance Department (6) except that symbols describing specimens designate a specific value of surface roughness, rather than a wide range of values for various applications.

The symbol used is an "F" with an attached number, for example, F_1 , F_2 , F_3 . There are 10 degrees of roughness, varying in 2-to-1 steps from 4 to 2000 micro-inches rms. Each symbol may apply to one or more sample finishes, but all are machined to the same roughness on a metal specimen block, to illustrate differences in surface characteristics encountered in practice.

For example, two surfaces are represented on the smoothest specimen one of which is lapped the other honed. A group of 4 specimens having a roughness of approximately 125 micro-inches is shown in Fig. 1. The complete set of gage specimens is shown in Fig. 2.

These specimens are available to design engineers, draftsmen, shop mechanics, and inspectors. They are used:

(1) To indicate to the design engineer and to the draftsman the smoothness and appearance of various degrees of finish, and to permit the selection of an exact degree of

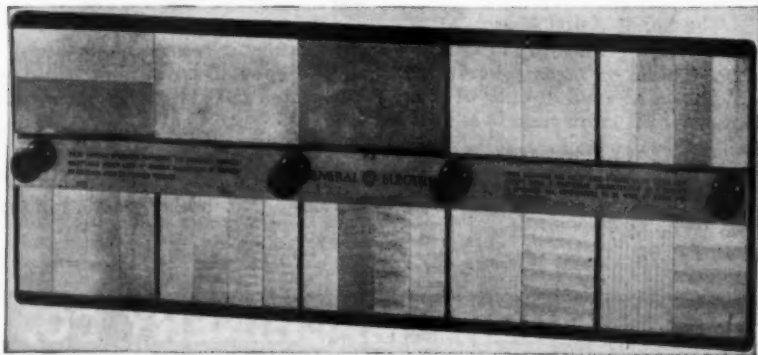


Fig. 2—The complete set of Machined-Surface-Finish specimens in panel.



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WITH CONOMATICS

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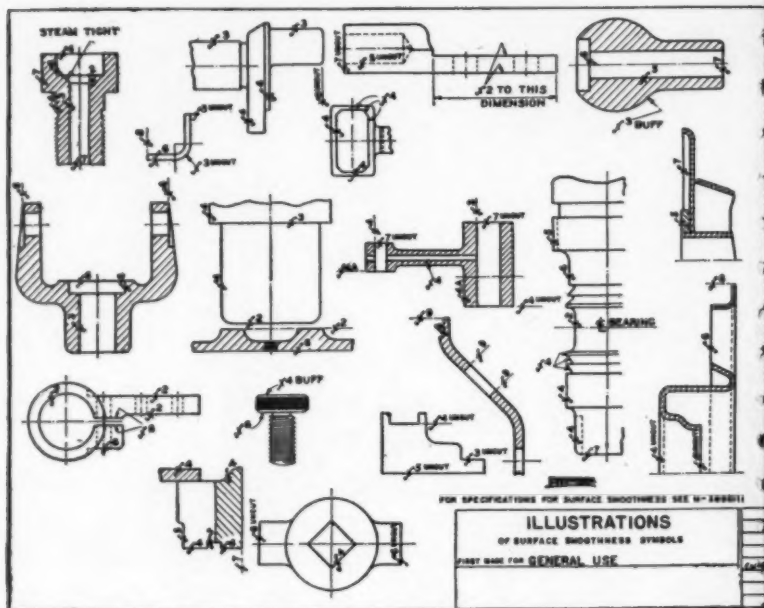


Fig. 3—Method of designating surface finish on a drawing. The proper "f" symbols are applied to the surfaces to be machined.

smoothness for the functional purposes intended.

(2) To enable the shop mechanic to visualize the degree of roughness designated on a drawing.

(3) To enable the shop mechanic and inspector to inspect the product surfaces by comparing them with the proper specimen.

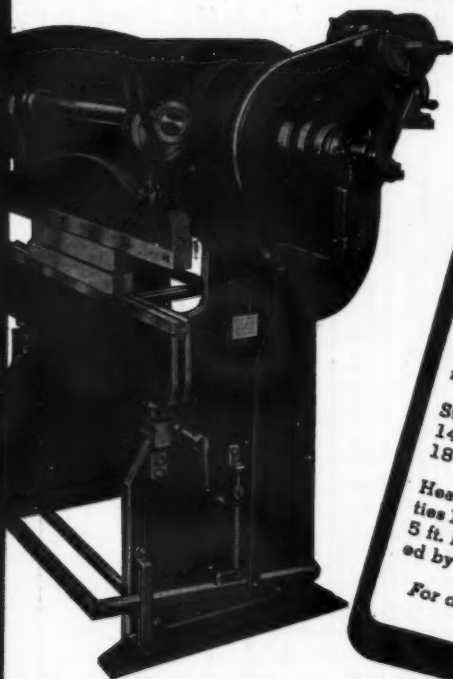
The method of designation of surface finish on a drawing is shown in Fig. 3. The proper "f" symbol is applied to the surface to be machined. The "f5 uncut" designation means that the specified degree of smoothness is to be obtained in the process of molding, casting, forging, punching, etc., without machining.

In general, the method of machining is not specified. Where this is necessary, however, the method is added to the numeral, for example "f4 buff." An instruction sheet on the correct method of use of these symbols is shown in Fig. 4. It will be noted that allowances have been made for any special cases which may arise.

In the inspection of machined surfaces the mechanic and inspector compare the finished surface with the gage specimen which most nearly approaches the appearance of the machined product. The method of inspection in all cases consists of comparison by sight and feel with the standard surface. The surfaces represented illustrate our standard "run

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14 gage, 4 ft. long; 16 gage, 5 ft. long;
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SPECIFICATIONS FOR SURFACE ROUGHNESS		Date: 2/19/81 By: [Signature] Title: [Signature]	
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WHERE "UNCUT" IS USED WITH THE "J" MARKER IT IS TO BE INTERPRETED THAT THE SPECIFIED DEGREE OF SMOOTHNESS IS TO BE OBTAINED IN THE PROCESS OF HOLDING, CASTING, FORGING, PUNCHING, ETC. WITHOUT MACHINING AND THEREFORE NO "STOCK ALLOWANCE" SHALL BE PROVIDED

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TENSION TIGHTENING..

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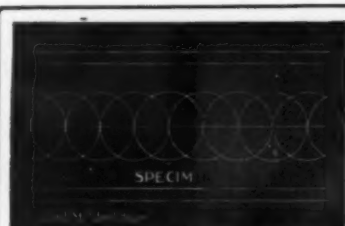
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of the mill" finishes. When finishes differ widely in appearance from the sample shown, special gages are made up. They are numbered in the same manner as the standard set and are built to measure the same roughness.

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REFERENCES:

- (1) A Proposed American Standard on "Surface Roughness" was developed by the Sectional Committee on Classification and Designation on Surface Qualities B46 under the auspices and procedure of the American Standards Association and was issued for a trial period not to exceed two years. It was published March, 1940, by the A.S.M.E., 29 West 39th Street, New York, N. Y.
- (2) "Surface Finish of Journals as Affecting Friction, Wearing-In, and Seizure of Bearings" by R. W. Dayton and H. R. Nelson, and L. H. Milligan, presented at the Cleveland Convention of the American Society of Mechanical Engineers on June 8, 1942.
- (3) "How Should Engineers Describe a Surface?" by O. R. Schurig, Mechanical Engineering, October 1940.
- (4) "Metal Sprayed Surface in Relation to Lubrication," by Harry Shaw, a paper presented at Manchester, Oct. 20, 1937, and reprinted by Metallizing Engineering Co., Inc., 21-07-41st Ave., Long Island City, N. Y.
- (5) "Friction, Fuzz, and Hairy Oil," by John Wulff, Technology Review, May, 1940.
- (6) "Standards for Ordnance Finishes," by Mary R. Norton, presented at the Cleveland Convention of the American Society of Mechanical Engineers on June 9, 1942.

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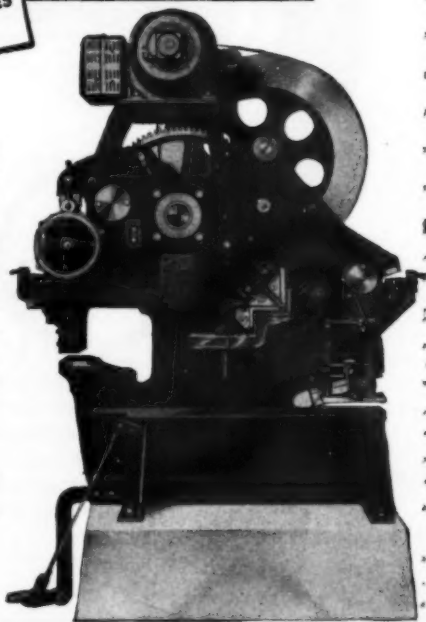
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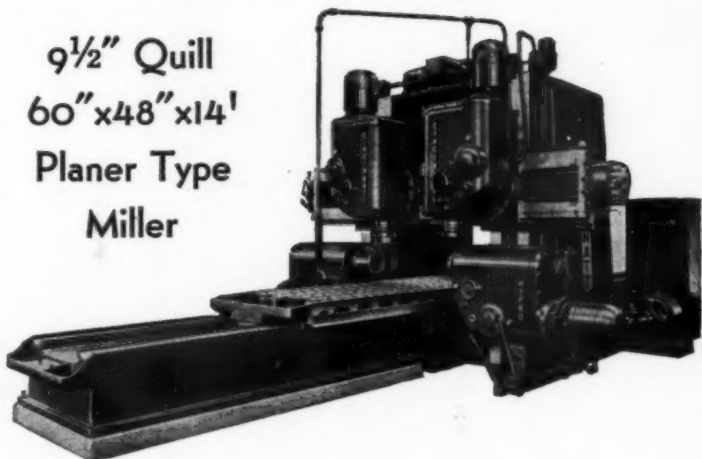


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The Foremanship Forum

By EDMUND MOTTERSHEAD

Part II—Some Personnel Problems

WEBSTER defines personnel as "the persons employed in any business" From that we might reasonably construe personnel problems as including almost anything that can happen among people working in a place. To the foreman, it can mean almost anything pertaining to men under his supervision.

However varied they are in detail, many problems of the foreman boil down to one thing:—A new foreman in a machine shop in Wisconsin asks:—"What is the greatest single problem a foreman faces?"

Putting the right man on the right job. That is not only your greatest problem, but successfully accomplishing it also solves many other smaller problems by eliminating them altogether.

This same inquirer goes on to ask:—

"I have several men apparently unsuited to their jobs. I am changing them around, but I wonder if you can tell me how they got on the wrong job in the first place? Maybe I can avoid that in the future."

One agency which has given very serious study to this very problem lists 6 major causes contributing to improper placement of workmen. One of these, and the only one for which the foreman is not responsible, is lack of suitable workers for the job . . . a local scarcity of skills, for example. The other 5 causes for having the wrong men in the wrong jobs, can all

be put squarely in the foreman's lap:

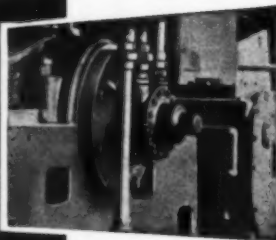
(1) Simple failure due to incompetence on the part of foremen. Having the wrong men in the wrong jobs would just be part of a general pattern of inability to act as a foreman.

(2) Partiality, or favoritism on the part of foreman. It might be, for example, that a job in question pays fairly well, and the foreman put his brother-in-law on it to keep his wife quiet altho he knew that the brother-in-law couldn't handle the job. It might be a friend, a relative, somebody to whom he owed money . . . there are plenty of reasons for favoritism, and thus plenty of opportunities for the foreman knowingly to have the wrong men on the wrong jobs.

(3) The foreman might be short on technical knowledge of the job, himself. He might not know the requirements of the job, what physical strength it demands; what mental aptitudes are necessary. A small matter such as the size and shape of a worker's hands on an assembly job could make a lot of difference in production. A man might look able-bodied and still be unable to do much heavy lifting. Any foreman who so desires, can correct this by making a thoro analysis of each job in his department.

(4) Every so often, a worker comes in and claims to have had such-and-such experience, is put on a job, and is discovered to have little or no knowledge about the work. To a cer-

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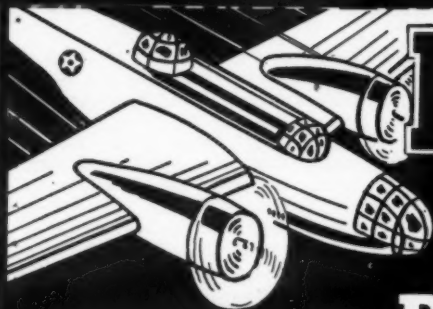
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tain extent, this situation is due to the fact that employers generally require experienced help. The newcomer wonders how he is going to get experience if he doesn't start, and thus fakes the experience for a chance at the job. It is a common notion that one need not be shy about experience and background to get a job anyway. I maintain this is the foreman's fault because with only 2 or 3 well-directed questions he can determine definitely whether the applicant has experience or not, and can thus avoid the waste, machine breakage or accidents that often result. A simple technical question regarding coolants, the color or nature of the metal shavings, the type or cutting speed of the tool, or many other things, reveal to an expert whether the new man really knows anything about the job.

An outstanding case of this so-called misrepresentation by the worker, which I call stupidity on the part of the foreman, happened in a machine shop in Western Illinois not long ago. A man applied for work and asserted that he had several years of miscellaneous experience as a mechanic. Among other things he said he knew how to run an engine lathe. The foreman asked him where he had learned to run the lathe. The man replied that his uncle had an old South Bend in the back of his garage. The job-seeker had taught himself to run the lathe. As it was fairly possible that the man could do something on a lathe, the foreman let it go at that. Notice . . . he took the worker's word for lathe-ability without inquiring further. So, about a month later, the foreman was in a hurry to have half-a-dozen little steel pins turned out; pins maybe $\frac{1}{4}$ " in diameter and 1" or so long, turned to limits of .01". He asked the man if he could handle the job. "Sure," he could! Note again that the foreman didn't ask him anything specific. About 2 hours later, the foreman came back and found the



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CATALOG ON REQUEST

man sitting at the lathe with his feet propped up against it, still working on the first pin, turning off about a thousandth at a time. What did the foreman say? Well . . . but it was his own fault. He could have asked the man in the first interview what, specifically, he had actually produced on a lathe. He could have asked him 2 hours previously, when he gave him the bar stock for the pins, how long he thought it would take to do the job. Misrepresentation? Maybe, so what? It was the foreman who did not actually find out what the man really could do.

(5) Indifference on the part of the foreman to the jobs, to the men, and to production is a cause of having the wrong men on the wrong jobs. Every so often you run into a foreman, like a worker, who just doesn't care what happens as long as he can keep the boss more or less satisfied and draw his pay.

As a foreman, thinking over your own problems, you face cold facts . . . or should. The order of the day is:—"get somebody on the job who will produce!" That means the right men on the right jobs in your department. Look around you. You have certain jobs and machines (work stations if you like the term better) and a man of some kind on each. The first thing to do is to use the men you have to best advantage. It usually costs too much to replace them, and the replacement might easily be worse these days when skilled labor is scarce.

You will find in your department 3 situations or 3 types of workers:—Fits, Misfits, and Unfits. Let's hope that they are all fits . . . men who produce a maximum amount of good work, are interested in their jobs and in the department; are satisfied with conditions, want to know more, want to cooperate, and make practical suggestions to help.

Misfits are the men who were mis-

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Quick production is not your only problem. Machine tools may be speeded up, hours saved by better set-ups, over-time and extra shifts may be installed. Yet this will be of no avail or benefit if the accuracy of your product is lost with your material ending on the scrap heap. The best investment for any shop is in inspection tools to detect and eliminate the errors at the source before they can affect production.

Give your men the right tools to measure with. Remember that whether you manufacture to close tolerances of "tenths" or to wide tolerances of plus or minus .002", you must still start with the basic accuracy in tenths of thousandths or else your work will not interchange with that produced in other shops.

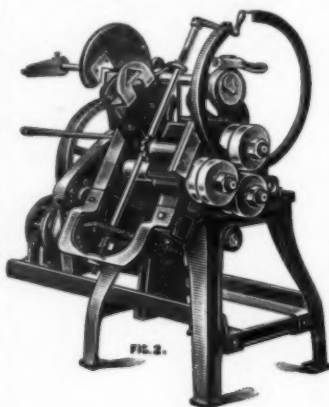
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placed because of any one of the reasons mentioned. Many men are really trying hard but don't seem to be achieving any results. They work hard all day. They are fairly honest. You must remember that their good intentions and good efforts are assets to your department, which cannot be bought as you buy skill and time, and these men should be studied carefully and dovetailed into your production pattern.

The unfit is not always unfit for his job, but possibly misfit. However, there are a few who are congenitally lazy, chronic disturbers, nervous, violent or irresponsible. When such men cannot be shifted to other jobs in the department, or cannot be given suitable work in other departments, they should be discharged for the good of the organization.

One company uses a convenient record-card for each worker, kept by the foreman to aid in solving just such problems as this. It is set up on a $5 \frac{1}{2} \times 8 \frac{1}{2}$ " card, printed front and back, with enough blank spaces to be flexible in handling and to give considerable information about each worker. It is reproduced. The back of the card, containing the job skill record, is also useful to the foreman in solving production-planning problems as they come up, finding a man who can do a certain type of work without removing someone else from a critically important work station etc.

In using this card, foreman collects information about the worker's personal life. A few casual friendly visits with the worker are sufficient to obtain the information and at the same time establish the foreman in the worker's mind as having a personal interest in him. During these visits, it is easy for the foreman to obtain definite impressions about the worker's personal traits. The ratings from plus 5 to minus 5 are purely arbitrary in the



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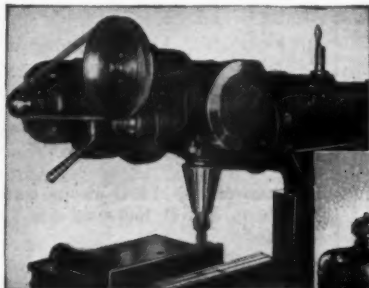
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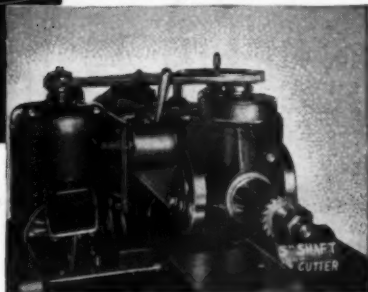
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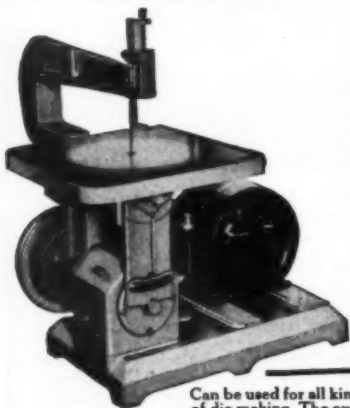
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mind of the foreman, but by applying it to the whole department, a comparative rating is established in the mind of the foreman, so that when a particular need arises or a special problem is met, he has in his mind . . . or in his file if he wants it . . . a more or less complete inventory of the personalities and abilities of his men.

A foreman in a middle-western railroad shop writes:—"There are two men in my department who have been with me for several years. They are supposed to be mechanics. Yet I have to stand over them all the time to see that they do a thing right. I hate to say they are falling down on the job and fire them, but it looks as tho I shall have to."

That, of course, is a decision you have to make yourself. However, when a workman seems to be falling down consistently on his job, there are several things you might consider, viz., his health and mental condition. It may be that a simple and often-overlooked condition such as anemia might be at the bottom of inattentiveness and consequent need of constant supervision. It might be an unknown deafness or failing eyesight which the worker would be the last to admit. It might be a condition in his home which brings on chronic worry to the point where the mental effort necessary to do his work properly is impossible. Age is a factor. Sometimes increasing age means increasing stubbornness, clinging to old practices. Sometimes it means shaken confidence as younger men are seen to perform better and faster. Sometimes shaken confidence is covered up with increasing irritability and stubbornness. It is certainly not enough to judge by surface indications.

It may be that condition of the machinery and equipment is a contributing cause. Quality of the raw materials may not be up to standard.

I'm not making excuses for the

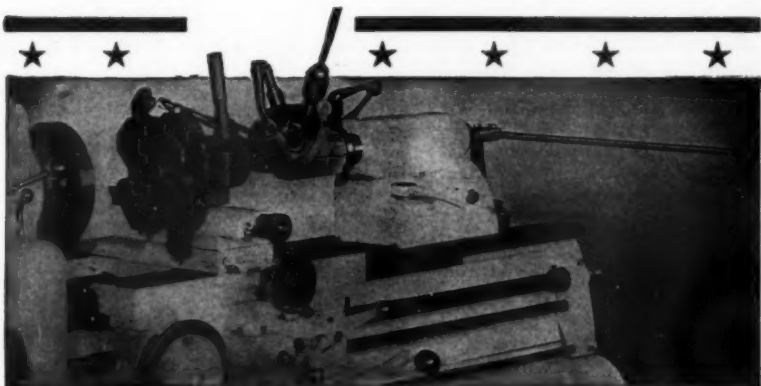
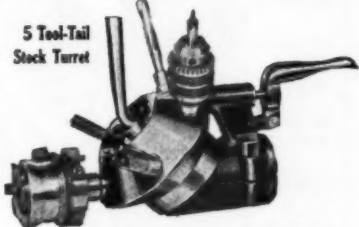


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5 Tool-Tail
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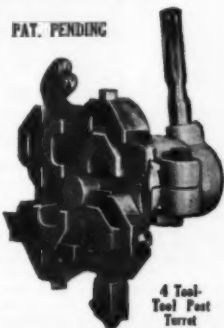
Yes, it's as easy as that! You simply attach the Jefferson Tail Stock Turret, the Jefferson Tool Post Turret, and the Jefferson Adjustable Pull Feed to your lathes as shown in illustration. The productive capacity of these machines will be more than doubled in many instances because there will be available at all times **NINE DIFFERENT TOOLS**.

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worker, but you have to remember one thing:—When you have personnel problems, or for that matter, other problems in your department, few of them are occasions for praise or blame. Fixing of responsibility followed by penalties ranging from "giving him heck" to firing the worker is not the answer. Your function is that of the family doctor, confronted with any number of ailments . . . (1) Diagnostic, to discover the real trouble and its

cause . . . (2) Curative. And thruout, the whole business should be treated impersonally.

What are the shop working conditions? Is there something consistently hazardous about the job that could make the worker nervous? Are there minor irritations such as unnecessary dirt, rough spots on the bench or splinters; does he have the right tools, etc.? What about overwork? Is the worker the right man for the job?

And what about you . . . do you always keep your promises to the men. Failure in this respect is a great destroyer of confidence and morale and cuts into workers' production and efficiency. I know one man who used to brag that he only made 2 kinds of promises in his life:—those to his landlord and those to his wife. The landlord he paid in advance, and his wife made sure he kept the others. Other than that he never made any promises. Which is a sound policy unless you have a good memory to go with the good intentions.

A foreman in a Connecticut paper mill writes about a problem which many foremen have faced:—"In our work here we have a special sort of problem. The men are working with heat and with chemicals and with large equipment. Certain jobs require considerable skill and yet are definitely unpleasant, so that we have some trouble getting men to stay. Have you any suggestions that might help?"

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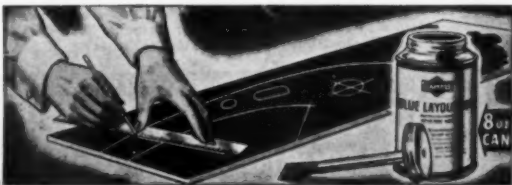


UNIVERSAL HIGH SPEED TOOL CO.
551 W. Washington Blvd. Chicago, Ill.

Machinists—Tool & Die Makers—Sheet Metal Men—Pattern Makers—Get... **FREE SAMPLE TAMMS BLUE LAYOUT DOPE**

Speeds layout time on brass, aluminum, copper, tin, stainless steel. Won't chip, crack, or flake off. Comes in handy 8 oz. bench type brush-in cans. Also pta., qts., gals., drums. Send for sample now!

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**Maintain closer tolerances with Dearborn
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DEARBORN GAGE COMPANY

Originators of Chromium Plated Gage Blocks

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DEARBORN, MICH.

OCTOBER 1943

MACHINE TOOL BLUE BOOK



"HDW" Heavy Duty Rotary—2000 counts per min.

A NEW HIGH-SPEED PRODUCTIMETER for the PRODUCTION FRONT

Especially adapted for quick starting and stopping applications...moderately priced....double worm drive, oil-less bearings, light-weight strong plastic wheels, hardened steel parts... assure smooth action and dependable service.
Send for Bulletin 1001

DURANT MFG. CO.

1928 N. Buffum Street
Milwaukee, Wisconsin

180 Eddy Street
Providence, R. I.

There are several things you can do, limited only by the nature of the job itself, and by company policies which you might have no part in forming. A good many workers will be satisfied with definitely unpleasant jobs if the pay is high enough. I happen to have a friend who is a welder in a company which makes large storage tanks. He spends 10 to 12 hours a day inside these tanks, welding in temperatures often around 140 F. This involves discomfort and danger. Many times these tanks have to be cleaned of all gases by steam before he enters for repair welding, which only increases the discomfort. But he receives \$1.40 an hour with time-and-a-half overtime, and can work all the overtime he wants. His company also furnishes him the best possible equipment, which is another thing to be considered. It also provides whatever safety devices procurable, has ready at all times a first aid specialist, respirator, etc., to handle

emergency cases. The company also makes it a point to select only men young enough, alert enough, small and agile enough, to handle the jobs well. It studies the men's physique, mental attitude, reactions to danger, speed of reflexes, background, environment, etc., to obtain the men best suited to handle the jobs under the unpleasant or hazardous conditions. Companies which provide window-cleaning service for large buildings, for example, almost always require small, agile men for outside duty.

There are two other things you may do. You can vary the routine of the job. Or, perhaps, find a worker on another job who is equally suited to the less desirable one and have the 2 alternate at intervals.

Above all, you can give the men all the encouragement you are able to, show them good will at all times, cheer them on, and indicate your sincerity in trying to do what you can to make

Rotary Files

These files are available in a number of different styles and sizes, in either High Carbon Steel or High Speed Steel.

Send for catalog showing a wide variety of standard shapes and special shapes. Perhaps we have what you want in stock, if not, we can grind it.

The Rotary File Co.



Hand Cut

If you have need for special shape Files, we shall be glad to submit the desired File for your approval and trial upon receipt of a sample or sketch.

This service is designed especially for your convenience, for which we make no charge.

STRATFORD, CONNECTICUT



IN PRODUCTION AND COMBAT *AAF FILTERS protect our fighting planes from DUST*

The whole story of the part which Dust Control plays in enabling industry to keep abreast of war production demands can't yet be told.

Only the men behind the scenes, and the American Air Filter engineers who have been responsible for designing and installing the equipment, know how vital adequate dust control is to maintaining deliveries and worker efficiency.

The aircraft industry is typical. Not only does clean air speed up delivery of planes but it also plays an important role in keeping them flying. AAF airplane engine filters are saving valuable replacement parts, reducing oil and gas consumption and lengthening the periods between overhauls.

If dust is a problem in your plant—write us. We can help you too! Send for free booklet "AAF in Industry."



AMERICAN AIR FILTER COMPANY, INC., 312 CENTRAL AVE., LOUISVILLE, KY.

IN CANADA, DARLING BROTHERS, LIMITED, MONTREAL, P. Q.



SAVE Labor and Time

Eliminate
heavy lifting.
Cut handling
costs. Table

swivels and locks in any position. Can be varied $15\frac{1}{2}^{\circ}$ by slight foot pressure, leaving operator's hands free. Engineered and built by tool engineers, experienced in production of special machines, dies, jigs and fixtures for exacting requirements.

Send **TODAY** for illustrated
catalog No. 2.

MIDWEST TOOL & ENG. CO.

112 Webster St.,

Dayton, Ohio

MILLING - DRILLING - BORING ATTACHMENT

for

Heavy Duty Operations



Uses many types of cutters on a wide range of work. $1/16^{\circ}$ to $3/4^{\circ}$ end mills.

FEATURES

Large size spindle with No. 9 B&S Taper. Large Quill Diameter with a travel of 4° . Furnished with $1/4$ h.p. motor.

The aluminum pulleys provide a range of six speeds, from 250 to 3000 R.P.M. The spindle takes $1/16^{\circ}$ to $3/4^{\circ}$ end

mills. Quill is counterbalanced and hardened and ground. Overarm brackets equipped with spreader screw for easy mounting.

PROMPT DELIVERY

Send for Descriptive Folder.

RUSNOK TOOL WORKS

4840 North Avenue,

Chicago, Ill.

conditions better for them. Remember that the most important man in the plant, so far as the worker is concerned is himself . . . nobody else. Whatever you can do to show him that you are trying to be helpful in his interests will help keep him satisfied on the job, even tho it is an unpleasant one.

A new foreman in an aircraft plant in California writes:—"Last week I was made a foreman, a promotion I am very proud of, in a plant like this with thousands of employees. I want to start right with this bunch here. I want to get their cooperation and friendship so we can work in harmony. The war work we do here is very important, and I have a stiff production quota to work on. What is the best way to start?"

By taking a personal interest in the men under you. Let's get a little more of the picture. You have been moved up to a position of considerable responsibility . . . promoted because you displayed sufficient mechanical skill and technical knowledge plus ability to lead men under you. You have before you materials, tools, machines . . . these you know from experience. You have also a group of men . . . these you may not know at all, or only to some limited extent, if you have been working in that department or on that same shift.

Each of these men is a complex of racial traits, characteristics, beliefs, prejudices, physical and mental abilities, temperament, laziness, love of family and home, and a host of other things. Regardless of that, or possibly even because of that fact, you, as foreman, are going to develop and direct that group of men into a working unit capable of solving and meeting any and all of your department's problems. Where you are short on technical skill or knowledge, you will have a capable lieutenant who can supply the lack. Where you are stumped for an idea,



AN OLD LESSON

...with new importance!

If the grinders you now have are not giving "top performance," check on the spindles . . . chances are that installation of Ex-Cell-O precision spindles alone will return your grinders to their former usefulness.

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Precision THREAD GRINDING, BORING AND LAPPING MACHINES, TOOL GRINDERS,
HYDRAULIC POWER UNITS, GRINDING SPINDLES, BROACHES, CUTTING TOOLS, DIESEL

Geared For Victory

Gear Specialists

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- WORM
- BEVEL
- HELICAL

The Taylor Machine Co.

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"TAYLOR - MADE"

*Lead screw ground
from the solid
AFTER hardening*

SMOOTH and compact.
Constant accuracy.
Parts subject to wear
are hardened. Large offset
adjustment eliminates need for
offset boring bars. Lead screw
is hardened tool steel. Its threads
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AFTER hardening.

Criterion heads are unexcelled
in accuracy, in ability to with-
stand constant use. Two sizes
1½" and 3". 4" and 1" bar
capacity. Order from your
dealer or write direct. Request
free literature. No obligation.

CRITERION
MACHINE WORKS
BEVERLY HILLS, CALIFORNIA

CRITERION
*Boring
Head*



you will have half a dozen fellows come out with suggestions to help. Where you are limited in strength and endurance, you will have a hundred men behind you. That is your big job.

The first thing is to get to know your men. You can't stay off at a distance from them and get them to pull together for you. Knowing each man's peculiarities, his strong and weak points, is essential to molding the whole force into an effective working unit. By getting close enough to the men to study them, you find also that you get a picture of yourself as they see you . . . which is vital to successful relations with them.

Let's look at these men. I don't know them; I haven't seen them. But I know that they are like any similar group of workmen anywhere. They want, first of all a chance for advancement and a chance to make more money . . . possibly a chance to work at a more pleasant or more interesting job. Why? Because most of them will have more or less of a family, rent to pay, grocery and doctor bills, clothing to buy, and some means of amusing themselves and their families. Remember when you were a worker and somebody else was the foreman? Working conditions also interest them. How clean and convenient are the toilets? What about a little fresh paint here and there to brighten things up? It does wonders for their spirits. Security on the job is also something in which they are vitally interested. Not only how the job will last (as evidenced by various slow-downs etc. in the past to make the work last), but also are they in constant jeopardy of being fired due to some whim of an irascible boss? Is the foreman even-keeled so that they don't have to worry about it as long as they do their work satisfactorily? Personal health is probably the greatest single interest of the average American adult. The Meridan

The New

LIBERTY



VERTICAL HIGH SPEED
GRINDING ATTACHMENT



The NEW LIBERTY high speed grinding attachments are designed for quick simplified setups in order to maintain the best possible results in the tool room. They are excellent for grinding gages, angles, slots, recesses, and surfaces which are either impossible to get at with a large wheel or require difficult and expensive setups in which small wheels are a necessity.

Designed for the most accurate service in grinding tools and various kinds of mechanical equipment.

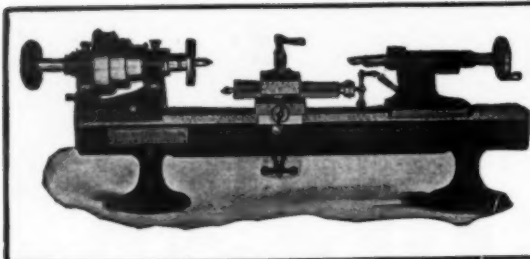
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FULL DETAILS.

Liberty

TOOL AND GAGE WORKS

235 GEORGIA AVE.

PROVIDENCE, R. I.



WADE Bench Lathes

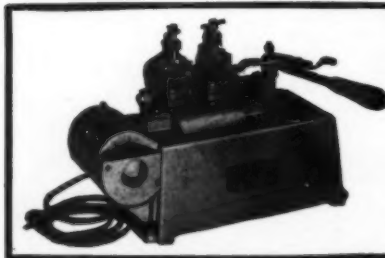
Economical, accurate, enduring for turning, drilling, threading, grinding, milling and screw machine operations.

Wade Tool Co.
Waltham, Mass.

Survey proved that. Not only the condition of their jobs as they affect health interest them, but also workers will appreciate a little display of personal interest in any other conditions . . . eyesight, bad sprains, a little sympathetic discussion of mutual experiences with false teeth . . . the old gag about the woman talking about "her operation" is based upon a fundamental human characteristic. People not only like to talk about themselves, they like to talk about their own health best, food and sex next, and amusements and hobbies third. Another thing the typical worker is interested in is obtaining the confidence of his boss and employers. This is a particularly crucial point. Confidence involves trust. The worker demands that you place your trust in his skill and knowledge and also in his integrity and intention to do the job to the best of his ability. I have heard literally hundreds of complaints about workers who re-

quire constant supervision and who have to be told to do a thing and how to do it, over and over again, and I am convinced that at least 90% of it is due to the fact that in the first instance, the foreman did not show any sign of trust or confidence. Consequently the worker never felt that he had any responsibility to show what he could do.

Fault is often found in executives in all walks of life. The hallmark of a capable executive is ability to build lieutenants or junior executives under him who will carry the responsibility and get things done. I know a man who happens to be in the landscape business, employing several older men as his gardeners and workers, and one highly skilled and trained horticulturist as his foreman. He issues orders to the foreman who transmits them to the men and starts a job. The next day the boss is on the grounds, per-



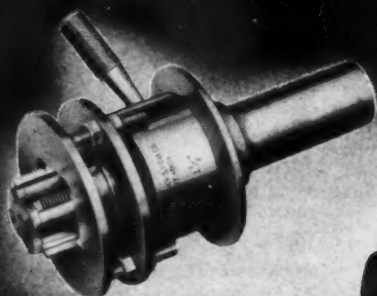
BAND SAW WELDERS

The No. 141 Bench Type Metal Working Band Saw Welder is available with or without grinder. Work can be annealed without removing from the Welder. Band saws up to 3/4" wide may be welded.

1 KVA—110 Volt—60 Cycle—single phase—5 point heat control—1 point anneal heat—Weight 40 lbs. Let us send you further details.

Mfrs. of complete line of Spot, Butt, Seam, Flash, Projection and Special Welders.

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DETROIT, MICH.



TYPE "M"
COLLAPSIBLE TAP



TYPE "G" SELF-
OPENING DIE HEAD

MURCHEY

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OTHER MURCHEY
PRODUCTS
Thread Milling
Machines
Shell Tapping
Machines

The Murchey Type "M" Collapsible Tap is designed to be used either as a rotating or non-rotating tool. Fast in action, positive in adjustment and accuracy guaranteed—

The MURCHEY TYPE "G" Non-Rotating Self-Opening Die Head is designed to be used on hand screw machines, with a suitable range of size adjustment into all MURCHEY heads.

MURCHEY MACHINE AND TOOL CO.

sonally supervising everything, changing his mind, bawling the foreman out in front of the men because the foreman hadn't done the work correctly when all the foreman did was to follow original orders. He never lets the foreman exercise authority without immediately following up orders to the foreman by doing the foreman's work himself. I used to talk this over with him, and he would reply;—"Yes, that's

so. But it is very risky business, trusting somebody to do something for you." He was simply afraid that the other fellow, regardless of skill or integrity, wouldn't do what he wanted just right . . . and the worst of it was in that case that the boss himself didn't know what he wanted half the time.

How, then, are you as a new foreman going to give the men the feeling that you have confidence in them?

In the first place, most of them were already working there when you came on the scene, and it is reasonable to assume that the majority of them know something about their jobs. The only thing you can do about their job-skill at present is to watch what happens for a while and check performance and skill. BUT, at the outset, you must, and I mean **must**, show the men that you have every faith in their intention to do the best they can, in their integrity. The point is, that for the sake of ferreting out a few dead-heads, you cannot afford to spoil the bulk of the good workers in the department. Sooner or later you can get rid of the poor ones, but if your conduct is determined by your action against the undersirable element, rather than by your actions for and with the desirable element, you will have a tough time. It is the difference between the American system for which we are fighting and the Gestapo. We

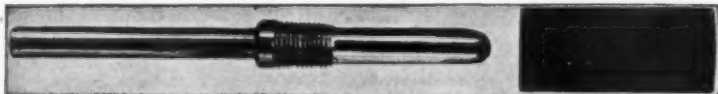


DEARBORN Automatic Chucking and Indexing Fixture MILLS OVER 1000 PARTS PER HOUR

Work held by draw in collets. Collets open and close automatically. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces. Minimum set-up time required. Speeds up production. Positive and accurate in operation.

J. W. DEARBORN
72 S. CLIFF ST. ANSONIA, CONN.

FLEXIBLE ABRASIVE WHEELS



Designed for precision work where flexibility is required, these wheels are useful accessories for sanding and finishing regular and irregular jobs, penetrating into difficult recesses, lapping holes in dies, finishing various shapes of metal, wood, rubber and plastic parts.

Useful for finishing propellers in aircraft construction. Descriptive bulletin and sample wheel will be sent on request. Prompt Deliveries.

FIELD ABRASIVE SPECIALTY MFG. CO.

**203 LOWE BLDG.,
DAYTON, OHIO**

Milling 1800 Pieces an Hour ON PARTS LIKE THIS ➔

Sundstrand Engineered Production on standard No. 00 Hydraulic Rigidmil illustrated nets 1800 pieces an hour milling slots in small brass parts. Slots are 0.057" wide ± 0.002 "; 0.281" deep ± 0.001 "; 1 1/2" long. Same machine, with suitable changes in fixtures and cutters, can give similar high production on wide variety of other parts.

No. 00 Rigidmil Has Everything

For High Production Small Milling On Bombs, Fuses, Firearms, Instruments, Pumps and Similar Work



Speeds for Everything . . . High-ratio head of No. 00 Rigidmil is made in two speed ranges, each having 64 spindle speeds — Type A, 57 to 2416 r.p.m.; Type B, 85 to 3600 r.p.m. — for best milling in everything from steel to magnesium.

Feeds for Everything . . . Sundstrand Hydraulic Feed Unit gives any desired feed from 1/2" a minute to 37" a minute; or optional range from 1 1/4" to 65" a minute.

Cycles for Everything . . . Hydraulic feed and rapid traverse at 400 inches a minute gives fast, accurately controlled, one or two-way, continuous or semi-automatic table cycles; provides high production at a minimum of operator effort. Easily adjusted standard dogs establish all usual table-cycles. Sundstrand Engineered Production Depart-

ment will recommend special dogs and cycles for unusual conditions. Diagram shows cycle for above job; uses three standard dogs and one special.



Early Deliveries . . . Standard No. 00 Hydraulic Rigidmils are available for early delivery. Write for full information.

GET FREE BOOK ➔

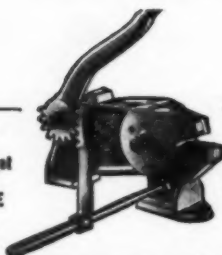
Get complete information about many exclusive advantages of Sundstrand No. 00 Rigidmil by writing for booklet shown at right. Ask for Bulletin 405.



SUNDSTRAND MACHINE TOOL CO.

2535 ELEVENTH STREET, ROCKFORD, ILLINOIS, U. S. A.

A
Midsize
in
SIZE
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A
GIANT
for
WORK! ★

THE WONDER CUTTER

Cuts wire, rods or band iron easily and quickly. Any size wire or rod up to $\frac{1}{2}$ inch round or $\frac{1}{4}$ inch square and band iron up to $\frac{1}{2}$ by 2 inches. Its small size and low price makes it possible to have more than one, mounted wherever convenient. Gauge can be set for repeated cuts of same length on both wire or band iron.

Write for further information and prices.

The Federal Foundry & Supply Co.
4602 East 71st St., Cleveland, Ohio

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**Precision
for COLLET CHUCKS
INTERNAL
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Collet collapses $\frac{1}{32}$ inch.
Accurate Grip. Chuck Shank
accommodates various sized
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Maintains balance of wheel—
eliminates whip. No twist on
collet—gives greater accu-
racy and longer life. Chuck
Shank supplied for any type
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Sizes, $\frac{1}{2}$
inch dia. to
No. 80 Drill.



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ERICKSON STEEL COMPANY
220 & BESSEMER AVE. CLEVELAND, OHIO

talk a lot about the abuses which arise under our democracy, and about the slowness with which the evils are corrected. But in the meantime, the rest of us have our rights and privileges . . . which we would not have under a system specifically designed to give somebody power to cure all abuses immediately and out of hand. Think it over. You are working in a war industry, producing for a conflict carried on by the brothers and uncles and nephews and sons of the men in your department . . . carried on so that these same men can have certain liberties.

See that they have those same liberties while working. Confidence begets confidence. Suspicion begets deceit and fear. And fear begets more fear and disaster.

Personnel problems, as indicated in the foregoing, cover a multitude of things. But 3 things the typical foreman can do to aid himself thruout.

(1) See that as far as possible, the right man is on the right job, from the standpoint of his physique, his abilities and his disposition.

(2) Take as great a personal interest in your men as time and your own disposition will permit.

(3) Remember that your men are also human beings, and deal with them according to those impelling motives and desires which are common to all humans.

(To be Continued)

BURR KEYSEATERS



Mill keyways in the run or on the ends of shafting already erected—save money on alteration, erection, and repair work.

Made in 4 sizes, for hand or motor operation.

Write for Bulletins and prices.

JOHN T. BURR & SON
429 Kent Ave., Brooklyn, N. Y.

AFTER THE EMERGENCY ...What?

TODAY the emphasis is on production. And it's natural to think of machinery mainly in terms of *temporary* output. But don't forget the emergency will someday be over. What then?

With the sellers' market gone, with competition keener than ever, then is when the lasting quality of really fine equipment will pay its greatest return.

Haskins Tappers bought today for war time production are *standard* machines—equally suited to high-speed precision performance on peace time work. A few quickly made adjustments—perhaps an inexpensive change in the holding fixtures—and your Haskins Tappers will be ready to help you hold down peace time production costs — so that you can keep sales and profits up! G. Haskins Company, 624 S. California Avenue, Chicago.



HASKINS
Precision
**TAPPING
EQUIPMENT**

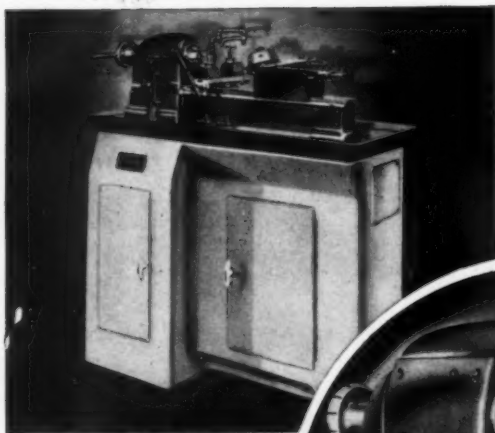


TODAY: This two-spindle Haskins Tapper is tooled for war time needs on aluminum fuse bodies.

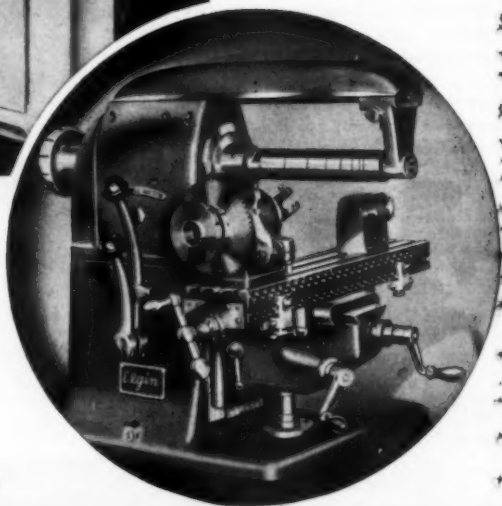
TOMORROW: Being a *standard* machine, the change-over to private industry production can be quickly and inexpensively made.

TWO NEW BOOKLETS—(1) "Holding Fixtures for Haskins Tapping Machines"—contains many new ideas; (2) "Percent of Thread Chart"—gives much valuable information. Send for either or both.

ELGIN PRECISION



**Precision Hand
Screw Machine**



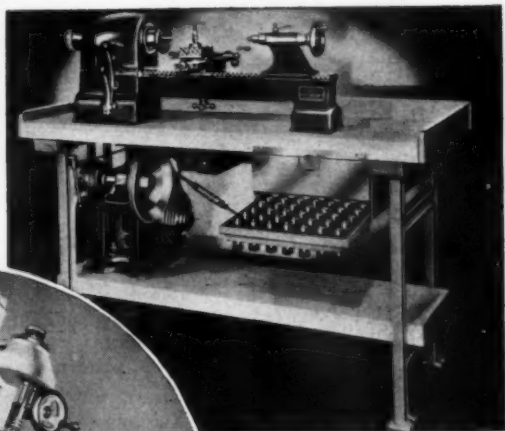
**Bench
Milling Machine**

Elgin's contribution to America's
All-Out Victory Program includes
Planch Lathes, Bench Milling Ma-
chines and Hand Screw Machines—
high precision machine tools essential
for the multitude of fine precision
operations entailed by our revitalized
war efforts.

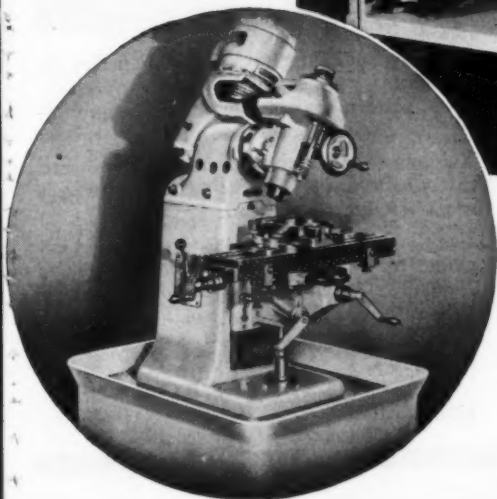
ELGIN TOOL

MACHINE TOOLS

You will find in all of these High Precision Machine Tools, mechanical devices and instruments that permit accurate work to close tolerances plus sturdiness and all-around reliability. Solidness assured by adequate design and rigorous care in construction.



Precision Bench Lathe



Vertical Milling Machine

WORKS

1772 BERTEAU AVE.
AT RAVENSWOOD AVE.
CHICAGO, ILLINOIS

THE IMPROVED LINLEY HIGH-SPEED VERTICAL MILLING MACHINE AND JIG BORER

A COST-CUTTER ON SMALL PRECISION WORK
LARGER TABLE AND MORE CLEARANCE



This new machine pays for itself on die, jig and fixture work as well as molds for plastics, metal pattern work, laying out, drilling, milling and boring operations.

Fast and simple with correct speeds to insure safety to tools. Ball bearing equipped; micrometer screw feed head.

Use the LINLEY and release your large machines for heavy work. *Write for Descriptive Bulletin and detailed specifications.*

LINLEY BROTHERS CO.

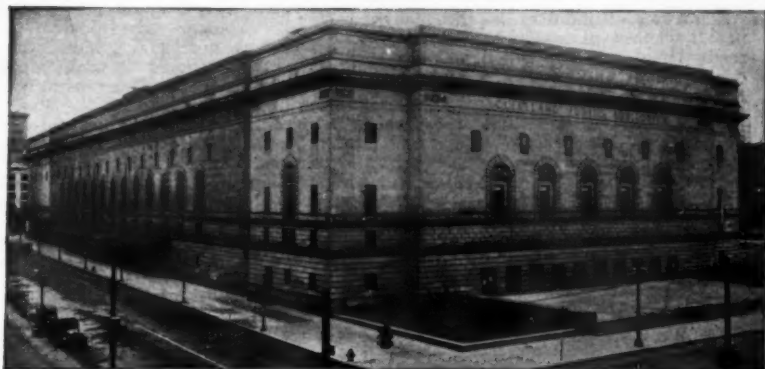
663 STATE ST. EXT.

BRIDGEPORT

CONN.

U.S.A.

Cleveland's Big Public Auditorium which will house the 1942 War Production Edition of The National Metal Exposition.



The War Production Metal Show

"PRODUCTION for Victory" is the keynote of the War Production Edition of the National Metal Exposition in Cleveland's Public Auditorium, Oct. 12-16, sponsored by the American Society for Metals in cooperation with the American Welding Society, The Wire Ass'n, Iron and Steel Division and Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers.

Mass dissemination of information and ideas at the show will answer many of the problems of production executives who are striving for maximum war production. Many firms have been working on products entirely foreign to their normal lines. They have had to work with new or improvised equipment, new metals, new processes and under closer tolerances. Meanwhile, Yankee ingenuity has developed speedier and better equipment, substitutes and alternates and the war effort will be helped by getting all these innovations and helpful ideas on the production lines without delay.

In addition to the exhibits, there will be many timely educational features. A 5-day lecture series will be held with

meetings at 5 P. M. Conducted by James P. Gill, Chief Metallurgist, Vanadium-Alloys Steel Co., the meetings will be devoted to consideration of tool steels.

In addition to the regular technical sessions of the participating societies at which 100 outstanding papers will be presented, there will be other important meetings. These will present for discussion such vital topics as substitutes, salvage, employee training, maintenance, etc. Government and War Production Board Officials will participate in these meetings.

According to W. H. Eiseman, Secretary of the Society and Managing Director of the Exposition, the more than 250 manufacturer-exhibitors are concentrating on educational displays. Many of these displays will be veritable consulting offices where industry can obtain information that will help solve the important production problems that confront us in this War of Metals.

The manufacturers and engineers who share their experience and achievements at these meetings will make a

substantial contribution toward winning this battle of production with the Axis.

Education of industry in the many new advances in welding, which already have greatly speeded war production—that will be the theme of the American Welding Society meetings.

The importance of training operators to meet the demands for welded construction will be stressed. At the opening session, the entire convention will be turned over to a discussion of that subject.

Each of the more than 60 welding papers to be read, will have an important bearing on some phase of war production in which welding has figured prominently. Every day there will be papers on some phase of air-

craft welding. One entire session will be devoted to welding in ship construction. Improvements in the welded construction of guns and gun mounts will be reviewed.

Discussions during the Metal Congress will be devoted to such important issues as "Doing More with What Alloys We Have by Using NE Steels"; "Doing More with Low Alloy and Carbon Steels"; "Speeding the Job by Better and Faster Production Hardening"; "Manufacture and Heat Treatment of Magnesium Castings"; "Segregation, Collection and Reclamation of Scrap"; "Speeding Production by Improved Metal Cutting Practice"; "Current Achievements in Powder Metallurgy"; "Training and Handling Inspectors"; "Getting By with Low Tin Alloys"; "Salvage of Broken Tools and Maintenance of Equipment", etc.

Exhibitors and Floor Plan

Acme Electric Welding Co., Huntington Park, Calif.—A-500.

Advance Polishing Wheels, Inc., Chicago.—E-113.

Agfa Ansco Div., General Aniline & Film Corp., Binghamton, N. Y.—C-238.

Alloy Castings Co., Champaign, Ill.—B-502.

Alox Corp., Niagara Falls—B-516.

Aluminum Co. of America, Pittsburgh—C-421.

Aluminum Ore Co.—C-421.

Alvey Ferguson Co., Cincinnati—S-162.

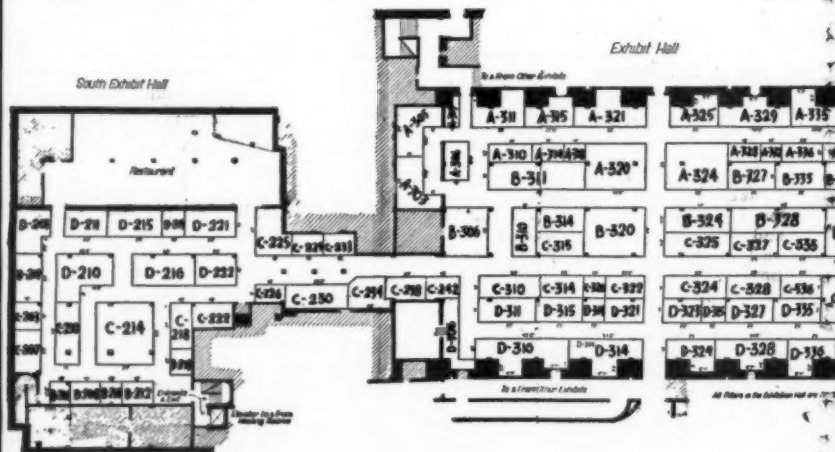
American Brake Shoe & Fdry., New York City—A-525 and B-320.

American Brass Co., Waterbury, Conn.—A-321.

American Car and Foundry Co., New York—B-314.

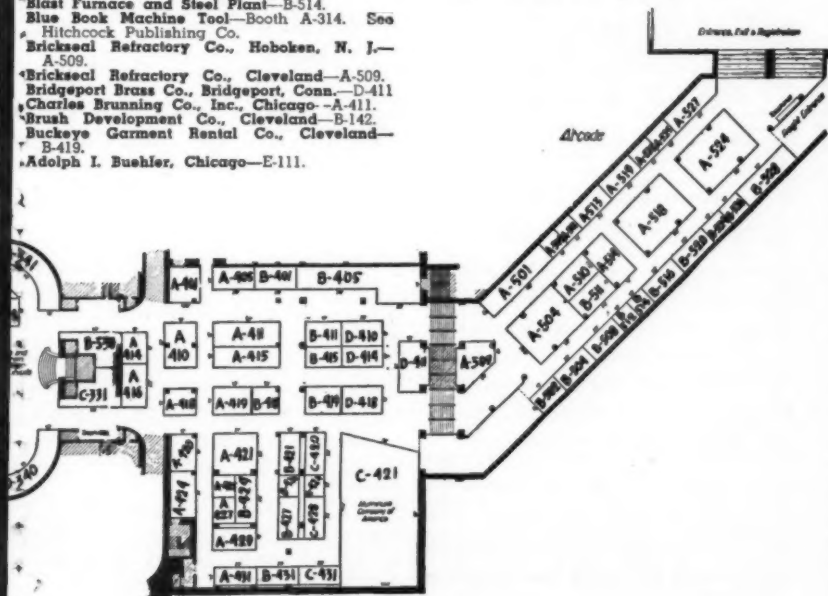
American Foundry Equipment Co., Mishawaka, Ind.—D-340.

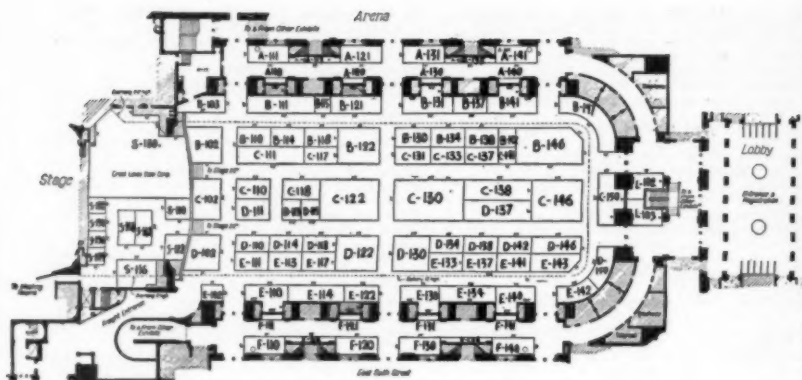
American Gas Furnace Co., Elizabeth, N. J.—B-103.



American Institute of Mining and Metallurgical Engineers, Inc., New York—B-508.
 American Machine and Metals, Inc.—A-418.
 American Machinist, New York—E-137.
 American Magnesium Corp.—C-421.
 American Manganese Steel Div. of American Brake Shoe & Fdry. Co., Chicago Heights, Ill.—A-525.
 American Metal Market, New York—D-319.
 American Society for Metals, Cleveland.
 American Welding Society, New York—A-427.
 Ameco Metal, Inc., Milwaukee—B-131.
 Anderson & Brown Co., Cleveland—B-137.
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 Atlas Fdry. Co., Detroit—B-320.
 Atlas Publishing Co., New York City—C-229.
 Atlas Steels Ltd., Welland, Ont., Canada—D-113.
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 Automotive and Aviation Industries, Philadelphia—C-203.
 Babcock & Wilcox Co., New York—C-325.
 Baker & Co., Inc., Newark, N. J.—B-415.
 Banner Iron Works, St. Louis—B-320.
 Barnett Fdry. & Machine Co., Irvington, N. J.—B-320.
 Bastian-Blessing Co., Chicago—C-131.
 Bausch & Lomb Optical Co., Rochester, N. Y.—D-150.
 Behr-Manning Corp., Troy, New York—C-141.
 Black Drill Co., Cleveland—D-146.
 Blast Furnace and Steel Plant—B-514.
 Blue Book Machine Tool—Booth A-314. See Hitchcock Publishing Co.
 Brickseal Refractory Co., Hoboken, N. J.—A-509.
 Brickseal Refractory Co., Cleveland—A-509.
 Bridgeport Brass Co., Bridgeport, Conn.—D-411.
 Charles Brunning Co., Inc., Chicago—A-411.
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 Canadian Radium & Uranium Corp., New York—S-130.
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 Catskill Metal Works, Inc., Catskill, N. Y.—A-514.
 Chase Brass & Copper Co., Waterbury, Conn.—B-327.
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 Chicago Steel Foundry Co., Chicago—L-102.
 Chilton Publishing Co., B-121.
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 Cleveland Graphite Bronze Co., Cleveland—C-322.
 Cleveland Tapping Machine Co., Cleveland—A-309.
 Climax Molybdenum Co., New York—A-501.
 Commerce Pattern Fdry. & Machine Co., Detroit—B-424.
 Continental Industrial Engineers, Inc., Chicago—C-133.
 R. W. Cramer Company, Inc., Centerbrook, Conn.—C-424.
 Crown Rheostat & Supply Co., Chicago—A-310.
 Darwin & Milner, Inc., Cleveland—C-118.
 Deepfreeze Div. of Motor Products Corp., North Chicago, Ill.—A-401.





Delaware Tool Steel Corp., Wilmington, Del.—A-325.

A. F. de Sanno & Son, Inc., Phoenixville, Pa.—B-431.

Despatch Oven Co., Minneapolis, Minn.—A-415.

Detecto Scales, Brooklyn, N. Y.—C-232.

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E. I. duPont de Nemours & Co., Wilmington, Del.—D-134.

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J. B. Ford Co., Wyandotte, Mich.—C-117.

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General Fdry. & Mfg. Co., Flint, Mich.—B-320.

Global Division of Carborundum Co., Niagara Falls, N. Y.—C-122.

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Gray Machine Co., Philadelphia—S-124.

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Greenlee Foundry Co., Chicago—B-320.

Gulf Oil Corp., Gulf Refining Co., Pittsburgh—A-329.

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Hamilton Fdry. & Machine Co., Hamilton, Ohio—B-320.

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Hammond Machinery Builders, Inc., Kalamazoo, Mich.—D-122.

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Heli Duty Electric Co., Milwaukee—D-142.

Hild Floor Machine Co., Chicago—C-324.

Hitchcock Publishing Co., Chicago—A-314.

The Machine Tool Blue Book, Hitchcock's Machinery Review, Industrial Export Catalogs and Wood Working Digest.

In attendance: R. C. Van Kampen, president;

Wesley G. Paulson, editor; R. J. Ferncase,

Midwest representative; D. B. Trott, Ohio representative; and M. H. Kauer, Editorial Dept.

A. F. Holden Co., New Haven, Conn.—B-147.

W. J. Holliday & Co., Hammond, Ind.—C-315.

E. F. Houghton & Co., Philadelphia—D-137.

Illinois Testing Laboratories, Inc., Chicago—E-133.

Independent Pneumatic Tool Co., Chicago—C-314.

Industrial Export Catalogs—A-314—See Hitchcock Publishing Co.

Industrial Heating—D-325.

Industrial Press—S-122.

Industrial Publishing Co.—A-416.

Industry and Welding, Cleveland—A-416.

Instrument Specialties Co., Inc., Little Falls, N. J.—C-335.

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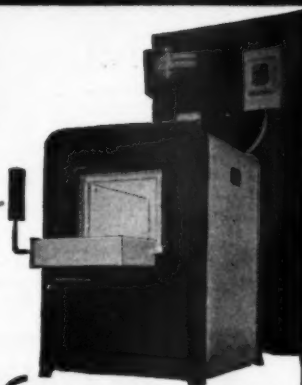
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 Valley Iron Works, St. Paul, Minn.—B-320.
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By W. C. DEGRAFF, Warner & Swasey Co.,
Engineering Dept., As told to Jerome Harris

WE have had 4 years to observe the value of our Technical Data File. Its chief benefit falls into two categories:

- (1) We have instant access to all available drawings, estimates, and original thought devised by our Engineering Department on previous jobs.
- (2) Duplication of expensive and time-consuming drawings and research is eliminated while, by the same token, completely new problems are more quickly handled.

An Organizational Problem

Since we had always, in the past, maintained a file of drawings and estimates, our problem in building our new system was chiefly one of organization. We needed an index that would lead infallibly to desired data. And we needed a simple, foolproof system for maintaining our technical file as new drawings and materials were added.

It is now possible to say that this plan has proved, in our case, to be completely practical—that it has saved us many hours of engineering effort



The complete Technical Data File, with cross-indexes, affords a convenient, compact working and service counter.



Close-up of the Order File containing all previous orders, indexed numerically.

at a moment when the nation's time-premium is at its highest.

The Technical Data File has 6 main divisions:

- (1) **Order File:** copies of all previous orders, tool lists, and complete specifications covering all special and standard tools manufactured on each order, are filed in folders.
- (2) **Order File Index:** a cross index by company name to previous orders.
- (3) **Estimate File:** copies of all estimates submitted, together with specifications and sketches.
- (4) **Catalog File:** copies of all catalogs, specification sheets, and other data supplied by the vendor on material procured from the outside for use in manufacturing tools to be used on the turret lathe.
- (5) **Subject File:** miscellaneous ideas and material classified by master subject and broken down to component sub-subjects. (A section of the list of classifications,

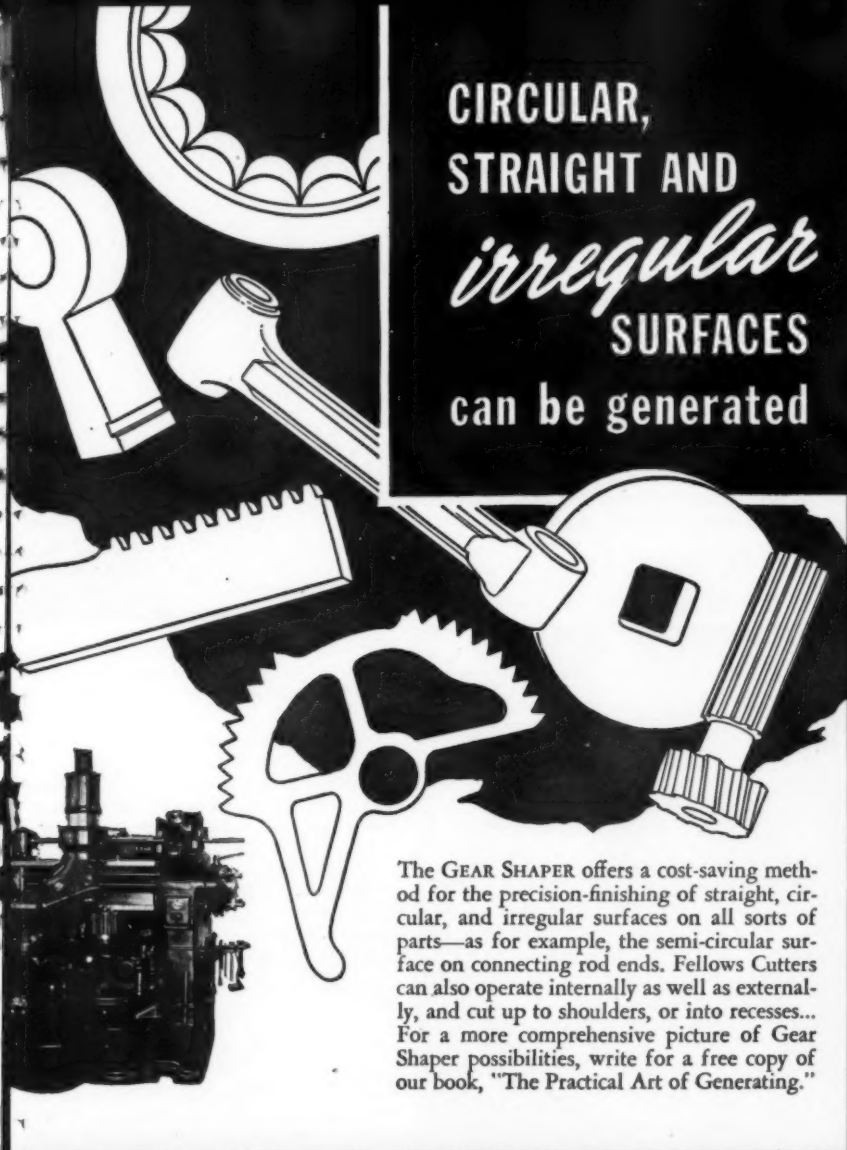
at the end of this article, shows our headings for this file)

- (6) **Subject Cross Index:** a listing by classification of all data pertaining to tools previously ordered or estimated. Cross index to all data is provided.

Thus, in these 6 files, we have not only centralized all pertinent engineering facts, but we have the means for **finding** the materials we have filed. It is well to note at this point that the heart of the system is the Subject Cross Index. And its success, of course, must depend on how accurately our classification of subject headings was conceived when the system was organized. Our list was compiled only after considerable research and study, and has proven itself effective in practice. The reader may find it wholly inadequate for his problem—but whatever his business, be it tool-maker or research laboratory, the overall aspect of his system would follow much the same general set-up as ours.

How the System Works

Suppose, then, that we are about to make an estimate on a new tool for the XYZ Automobile Co. We would



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first consult our Order File Index for previous tools manufactured for XYZ. The index to the Order File is housed in a Kardex Visible System. For each order for special equipment we have received in the past from XYZ, a clerk has prepared a separate Kardex form. These forms are installed in Kardex equipment according to straight alphabetical indexing. When more than one order is received from a single firm, successive forms for each order are filed numerically after the original card. Thus, all orders from a single firm can be located at a single spot in the index.

On each Order File Index form for the XYZ Co., there are entered full details of each tool covered by the order. This includes the quantity, the name and number of the tool, the

(Right) Closeup of the Chainindex Cards in the Subject Cross Index.
(Below- The Order Cross-Index housed in Kardex Visible Equipment.



drawing number, the purpose for which the part is to be used, and the part number which is to be made with the tool.

From these Order File forms, then, we can get this data at a glance:

- (1) A summary of all tools manufactured for each customer.
- (2) A cross reference to drawings, which are filed elsewhere by number.
- (3) Information as to whether or not there is pertinent information we can use in the Order, Estimate, Subject or Drawing Files.

Having determined that there is an old order that might apply, we consult the Order File itself. This is set up in standard letter size filing cabinets with a separate filing folder for every order. It is indexed by company name and then by order number. In it we have a copy of the actual order with tool lists, costs, etc.



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It's good business to take your own Distributors into your confidence and use them all the time. We know, because for many years they have been *our* Sales Representatives

on Cle-Forge High-Speed Drills and Peerless High-Speed Reamers throughout Industrial America.

This incident is typical of the unusual services that many **Mini Supply Distributors** are rendering their customers during the Emergency.

The CLEVELAND
DRILLS, REAMERS, MILL & LAT. OPS. AND TOOLING EQUIPMENT

30 BEADE ST. NEW YORK
825 SECOND AVE. DETROIT

9 NORTH JEFFERSON ST. CHICAGO
LONDON - E. P. BARRUS, LTD. - 39-36-37 UPPER THAMES ST., E.C.4

**TWIST DRILL
COMPANY
1242 EAST 49TH STREET
CLEVELAND**



"CLEVELAND" DISTRIBUTORS EVERYWHERE ARE READY TO SERVE YOU

HOW THE FILES ARE HOUSED

Order File: in vertical filing cabinets.
Indexed numerically by order number

Estimate File: in vertical filing cabinets.
Indexed numerically by estimate number.

Catalog File: in vertical filing cabinets.
Indexed by name of vendor, alphabetically.

Subject File: in vertical filing cabinets.
Indexed alphabetically by classification.

Subject Cross Index: in Chaindex installed
in Kardex Cabinets. Indexed alphabetically
by subject classification.

Order Cross Index: in Visible Kardex Cabinets,
8" x 5" forms. Indexed alphabetically by
Customer's name and order number.

List giving location and
functions of the different
files and indexes.

At the same time, having discovered from the Kardex form the drawing numbers of pertinent tools, we have these pulled from the Drawing File. This file is indexed numerically, and can be consulted by obtaining the number of the drawing needed from the Kardex Order File Index. The Subject File is also investigated.

If we desire, at the same time, we consult the Catalog File which is indexed alphabetically according to the vendor's name. Thus, all accumulated information for XYZ has been brought to light in a matter of minutes by the Kardex Order File Index.

When A New Customer Is Handled

Let us suppose, for the moment, that an order is received from a company

with whom we have had no previous contact. Of course, we have no accumulated data for that company. But somewhere in our files, it may be hoped, we do have drawings and data that will bear upon the problem in our new customer's order.

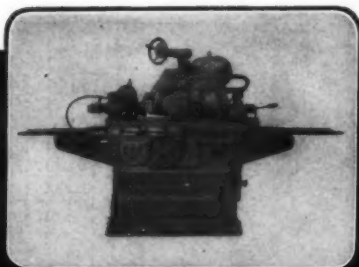
It is at this point that our general Subject Cross Index assumes major importance. As already stated, the Subject Cross Index has been broken down according to a pre-determined overall listing of parts and tools. For each subject heading, a Chaindex Visible card was created when our system was installed. (See Exhibit A)

These Chaindex cards intermember ingeniously, one under the other, much as in a chain. They are housed in standard Kardex pockets and installed

EXHIBIT "A"

Auto-Housing - Differential Case-A-112	
Chrysler Corp.	
OF #276144 7/1927	
□	□

Exhibit "A" showing a
sample Chaindex visible
card.



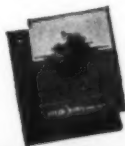
New
FITCHBURG
 ADJUSTABLE "TYPE C"
Angular Head
GRINDER

FOR PLAIN CYLINDRICAL GRINDING . . . FROM 0 degrees to 45 degrees

The Fitchburg Adjustable "Type C" Angular Head Grinding Machine is another single application of the Fitchburg Standard Bowgag Wheelhead Unit. The "Type C" is designed to handle a wide range, and a number of types of jobs. In finding ways to cut your grinding time and costs it will pay to consider what this machine can do.

This newest of Fitchburg plain cylindrical grinders has a Standard Wheelhead Unit mounted so that it may be located to grind from 0 degrees up to a 45-degree angle. Previously angular head grinding machines have been equipped with fixed heads for single purpose grinding. The Bowgag head on the Fitchburg "Type C" is adjustable and can be swivelled to various positions for standard plain grinding, thus providing greater grinding utility. The head goes through a completely automatic cycle — rapid traverse to work, correct feed, grinding dwell and rapid return. The workhead is adjustable for various lengths of work and the work spindle can be equipped for single or variable work speeds. The truing device is hand operated and mounted on the work table.

The Fitchburg "Type C" grinder is designed to meet war time production speed and maintain highest efficiency. Ease of operation is assured by centralized controls. In every detail it meets all the requirements of plain cylindrical and taper grinding — in large or small lots of work, with assured accuracy and fine finish, at low cost.



Send for new fully illustrated folder —
 write for it on your business letter-head —
 it will be mailed free.

FITCHBURG GRINDING MACHINE CORP.

FITCHBURG, MASSACHUSETTS, U.S.A.

Manufacturers of — Bowgag Wheelhead Unit, Multiple Reversing Grinding Unit, Spindle Grinders,
 Taper Grinders, Gear Grinders, Ball Mills, Bar Grinders, Surface and Special Grinders.

Order No. _____
Customer's Name: _____
Cracking Corp. _____

Crackling Open.

For Maching

[illegible]

DATE _____

All material other than stock - Ordered by _____
Listed by _____
Checked by _____

516-649-75

Here are reduced copies of two of the standard mimeographed forms. Exhibit "B" (above) is the Special Tool List on which the Engineering Dept., enters a list of the tools required on a new order. Exhibit "C" at the right is an indexing form for subject classification and cross-indexing.

LEGISLATIVE COORDINATOR, B-776

DATE.....
CASH NO.....
DEPOSIT NO.....

NAME OF COMPANY.....

CITY..... STATE.....

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CROSS INDEX

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FILED IN 107

1. The first step is to identify the problem or question that needs to be answered. This involves understanding the context and the specific requirements of the task.

classification.

FI.....DATE.....

FILE WITH MATERIAL IN S.F. OR O.F. FOLDER.

TYPESET INSTRUCTIONS -

Type order card from special tool list down to

Other Instructions

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FILE CLERK INSTRUCTIONS -

Pile the following material in subject file and check cross references

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GOVERNOR CONTROL ASSURES UNIFORM GRINDING



**VIBRATIONLESS SPEED UNDER
LOAD LENGTHENS WHEEL LIFE**

A Grinder for Every Job

NEW YORK (CP)—Essential to fast uniform grinding is vibrationless speed under load. In the large line of Chicago Pneumatic Grinders this feature is assured by stability and rigidity of design, which, coupled with governor control, not only results in the removal of maximum metal but also minimizes wheel damage and uneven wheel wear.

There's a CP Grinder for every job. Write for your copy of the latest CP Catalog of Pneumatic Tools and Accessories—it describes the complete grinder line.

↑ **FAST, EFFICIENT GRINDER** for general use, CP 314 is ideal for light to medium-heavy wire cleaning. Ten models, wide range of speeds, variety of equipment.



↑ **STURDY CONSTRUCTION** of all CP Grinders assures long, heavy-duty service and minimum maintenance.



PNEUMATIC GRINDERS

described in latest
Pneumatic Catalog:

GENERAL PURPOSE
MEDIUM TO HEAVY-DUTY
ROD, DIE AND ANGLE
POLISHERS
SANDERS

Send for a Catalog

**CHICAGO PNEUMATIC
TOOL COMPANY**

General Offices: 8 East 44th Street, New York, N. Y.



↑ **LIGHT WEIGHT, TRUE BALANCE** of all CP Pneumatic Grinders make handling and control easy for the operator and increase production.

CHICAGO



PNEUMATIC

PNEUMATIC TOOLS

ALSO: Air Compressors, Electric Tools, Rock Drills,
Hydraulic Aviation Accessories, Diesel Engines

WRENCHES
DRILLS
REAMERS
RIVETERS
CRIPPERS
GRINDERS

in Kardex cabinets. So compact is this intermembering that we have been able to install over 1,000 cards in a single cabinet!

The Chainindex cards are indexed alphabetically by major subject classification and sub-subject. On the card are also given the machine on which the tool is to be used, the name of the customer for whom it was made, and the order number and date of order. A prefix coding of OF or EF is also assigned. OF refers to the order file—EF to the Estimate File.

It is a simple matter, with this cross index, to determine whether there are drawings or data within our file that will help us to handle the new customer's order. And due to the extreme compactness of the Chainindex set-up, this information can be determined at a single glance!

It is well to note that this Subject, Cross Index is also of value when handling an order for an old customer. If, the XYZ Co., for example, were to order a new type tool never ordered by them before, we would consult the

SUBJECT: CLASSIFICATION

- Account Numbers
- Adapters
- Agitators - See Washing Machine Parts-Agitators
- Air Conditioning
 - Valve Body
- Air Bottles
- Air Equipment
- Air Motors & Tools
- Airplanes
 - Bearings & Bushings
 - Connecting Rods
 - Counterweight
 - Crankcases
 - Crankshafts
 - Diffuser
 - Engine Cylinders
 - Fittings
 - Housing
 - Hubs
 - Adjustable pitch
 - 2 Blade
 - 3 Blade
 - Blade Sockets
 - Landing Gear
 - Motors
 - Parts General
 - Propellers & Hubs
 - Valves
 - Wheels
- Andirons - See Brass Goods
- Annealing - See Heat Treating
- Assembly Plate - See Electric Motors
- Automatic Chucks - See Turret Lathes
- Automobiles
 - Bearings & Bushings
 - Brake Drums
 - Carburetor Parts
 - Connecting Rods
 - Counterweights
 - Crankcases
 - Cylinders
 - Differential
 - Diffusers
 - Distributors
 - Fluid Drive

Two things

YOU SHOULD KNOW

THIS



EMPIRE TOOL COMPANY'S
LUERS PATENTED
CUTTING-OFF

BLADES

You should know these blades because they have so many advantages over the ordinary type of cut-off blades. (1) Their distinctive T-shape provides exceptional side clearance, (2) the hollow-ground top allows free escape of the chip, and (3) the continuous longitudinal taper maintains a constant back clearance regardless of repeated sharpenings. Thus, excessive friction, which is the greatest cause of breakdowns, is eliminated.

Blades, both tapered and parallel in the longitudinal cutting width, carried in stock.

and THIS



EMPIRE TOOL COMPANY'S
LUERS PATENTED
CUTTING-OFF TOOL

HOLDERS

You should know these tool holders for their unusual features in facilitating and speeding cutting-off operations. Aside from accommodating the Luers Blades, they possess these unique advantages: (1) will hold blade with bull-dog grip by virtue of the specially-designed, double-cam lock, (2) provide speedy and simple set-up of blade, (3) permit quick removal of blade alone for resharpening, without disturbing set-up, (4) admit quick replacement of blade accurately to original position, (5) made for all standard hand and automatic screw machines.

... TO SPEED YOUR CUTTING-OFF OPERATIONS

The Blades That
Reduce Friction

EMPIRE Tool Co.

8782 Grinnell Ave.
Detroit, Mich.

A PRECISION POWER FEED EXTERNAL GRINDER

THE GRENBY EG-10 EXTERNAL GRINDER

- Precision Spindle
- Power or Hand Feed
- Swivel on Grinding Head
- Swivel on Work Head
- Grinding Capacity 8"
- Cross Travel 4"
- 8" x 1/2" x 1/4" wheel



No. EG-10

GRENBY MFG. CO.

BRIDGEVILLE, CONNECTICUT

subject index for material prepared for other companies on a similar problem.

How the File Is Kept Up-To-Date

Having established a going system for reference to our Technical Data File, our final job was to develop a plan that would permit us to enter new data as it was received.

Two standard mimeographed forms were prepared. On the first (See exhibit B), known as the Special Tool List, the Engineering Department enters a complete list of all tools concerned with a new order. Using this Special Tool List, an Indexing Form (Exhibit C) is filled in and passed to someone in authority for approval as to subject classification and cross reference details. The approved Indexing Form is then turned over to a stenographer who prepares the Kardex Customer order form, the Chainindex Reference cards for filing in the Subject Cross Index, and a gummed label for the folder in which the order data is to be filed.

The important step in this process, of course, is the approval of subject classification. Where there is any possible overlapping as to Subject heading, two index cards are created—one for each heading. In this manner there is no danger of material becoming "hidden" within the Order, the Estimate, or the Drawing Files.

There can be no doubt but that our Technical Data File has been highly productive in saving our Engineering Department time and money. As an aid to improving both product and customer service, particularly in the stress of the War effort, it has become an indispensable agent.

"Keep 'em Flying"

**Buy U. S. War Savings
Bonds and Stamps**

SOMETHING NEW HAS BEEN

Added...

TO THE LINE OF
**PRODUCTO
MODERN
MACHINE
VISES....**

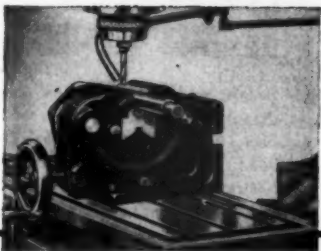
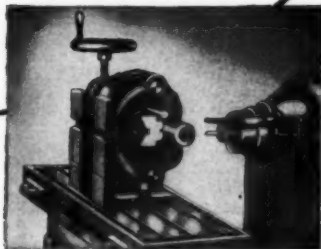


Self-Centering Shaft Vise

An entirely new idea in Vise construction in this Country. For machining keyways and slots in shafts or spindles — range of sizes $\frac{1}{4}$ " to $3\frac{1}{4}$ " diameter — suitable for vertical or horizontal mounting. Setting of Vise remains unaltered for all work diameters and insures accurate radial cuts. Shafts correctly located in V jaw by equal movement of two jaws. Hardened V jaw reversible in Vise.

Size of Base 8" x 7 $\frac{1}{4}$ " — Approximate weight 80 lbs.

Write for circular



The PRODUCTO
MACHINE COMPANY



990 HOUSATONIC AVENUE
BRIDGEPORT, CONNECTICUT

3017 MEDBURY AVENUE
DETROIT, MICHIGAN

A PRECISION POWER FEED EXTERNAL GRINDER

THE GRENBY EG-10 EXTERNAL GRINDER

- Precision Spindle
- Power or Hand Feed
- Swivel on Grinding Head
- Swivel on Work Head
- Grinding Capacity 8"
- Cross Travel 4"
- 8" x 1/2" x 1 1/4" wheel



No. EG-10

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subject index for material prepared for other companies on a similar problem.

How the File Is Kept Up-To-Date

Having established a going system for reference to our Technical Data File, our final job was to develop a plan that would permit us to enter new data as it was received.

Two standard mimeographed forms were prepared. On the first (See exhibit B), known as the Special Tool List, the Engineering Department enters a complete list of all tools concerned with a new order. Using this Special Tool List, an Indexing Form (Exhibit C) is filled in and passed to someone in authority for approval as to subject classification and cross reference details. The approved Indexing Form is then turned over to a stenographer who prepares the Kardex Customer order form, the Chainindex Reference cards for filing in the Subject Cross Index, and a gummed label for the folder in which the order data is to be filed.

The important step in this process, of course, is the approval of subject classification. Where there is any possible overlapping as to Subject heading, two index cards are created—one for each heading. In this manner there is no danger of material becoming "hidden" within the Order, the Estimate, or the Drawing Files.

There can be no doubt but that our Technical Data File has been highly productive in saving our Engineering Department time and money. As an aid to improving both product and customer service, particularly in the stress of the War effort, it has become an indispensable agent.

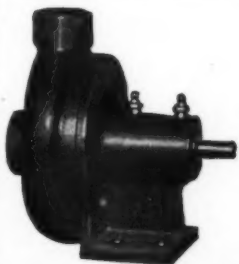
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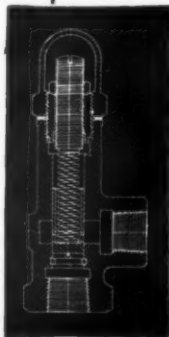
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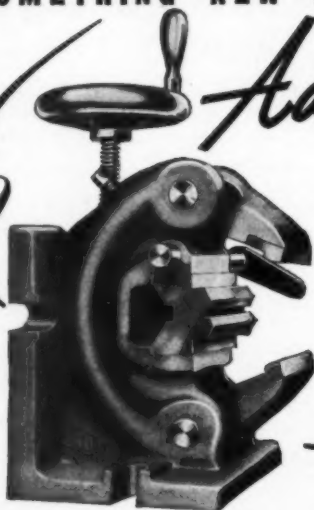


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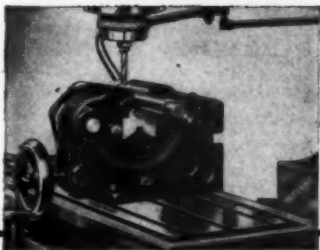
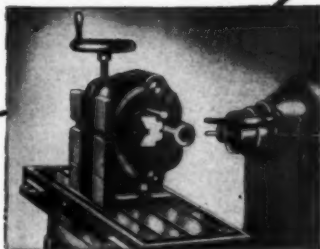


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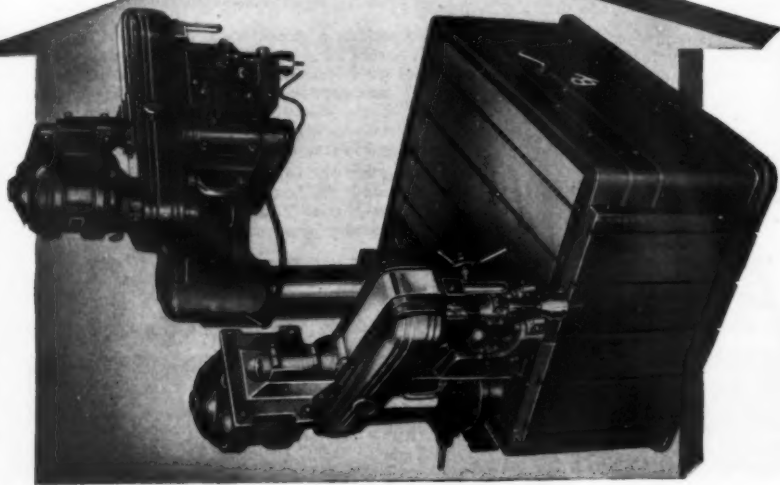
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When Women Work

By DR. J. H. HAZLEHURST,
Panel Consultant, War Production Board
As told to MARIE G. HEUER

A PERSONNEL manager told me a few weeks ago that he was putting a number of women to work, and had to argue the point with several executives and practically all of the foremen before he could add their names to the payroll. This is typical of many of the small plants supporting the bulk of the working population, in spite of the fact that the need for women in the war effort is beyond dispute.

I'm not so much concerned with the jobs women can do or how many women are being pushed into jobs. I'm more concerned with the things personnel people must consider to get effective service from women in industry, as well as in some of the larger factories. But shop executives and foremen in smaller plants are afraid of them and can see a million problems that might come up.

Of course, problems do come up. And management must be aware of them to develop the kind of relations with women workers that will make for harmony and maximum production.

So far as measurable characteristics are concerned, all the studies made indicate that there is little difference between men and women with regard to brains or abilities. The differences we

see are cultural, the result of our economic and social set-up. But those cultural differences have a definite effect on the way women must be treated.

Perhaps the chief characteristic is the one that everyone recognizes — that women usually take jobs temporarily. This is not true of career women in



Candid angle shot of milling machine operation (Westinghouse photo).

professional work, but back of the average woman's mind, consciously or unconsciously, is the notion that her job is going to be temporary—until she gets married, until her husband gets a better job, or some other similar reason. One result of this attitude is that women in industry have from 2 to 3 times higher absence rates than men, and firms utilizing women workers must plan for this when making their general schedules. Whether a woman lives in her own home or with her parents, she characteristically thinks more in terms of home than men do. If a member of the family is ill, or any other difficulty comes up at home, a woman will stay away from her job until it is settled. Women will take time off to do Christmas shopping and to do a lot of things that men would not do during working hours. And married women are likely to have higher absence rates than single women.

I might mention that if you talk with executives and they get down to cases on women in the plant, they will, very likely, bring out the point that a woman may not take a day or two off each month, but that there is generally about a week when their capacity is impaired. A number of studies have been made on whether there is physical and psychological impairment during such times. Every study shows there is no impairment of visual acuity, steadiness, or any of the other abilities required on precision jobs. It is true, however, that many women are incapacitated for a half day, or are extremely uncomfortable, and it is important to have rest room facilities, a medical shelf, and if possible a nurse or doctor available as a routine part of the health program.

The average woman's attitude that her job is only temporary has an effect that may be a definite advantage in the war emergency. She tends to be happy at a job different from the work

she had in mind, or is accustomed to doing. If men are in jobs not leading to their long term goals, they're dissatisfied. But women don't mind working on jobs they had not thought of before, especially when the wages are good. When you suddenly have a war contract and need workers in a hurry, women may not be so fussy as men in selecting jobs. They will give their full attention to jobs, even tho they are not fundamentally interested in them.



Women rate high at jobs requiring manual dexterity and patience. This is Miss Harriet Zimmerman, grinding machine operator in one of the American Car & Foundry tank building plants.

Women are more interested in people, and are more influenced by them than are men. If a man likes his boss, that doesn't mean that he likes his job. But if a woman likes her boss, she likes her job. She's influenced by the people she works with too, and will "walk out" on the job if her relationship with fellow workers is not pleasant. Try to get homogeneous groups. Don't run Polish girls and Italian girls together,

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—ROTARY SELF-OPENING DIE HEADS—

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—ROTARY COLLAPSIBLE TAPS—

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DIVISION OF CONSOLIDATED MACHINE TOOL CORPORATION

ROCHESTER

NEW YORK

if you can help it. Instead, put a gang of Italian girls on one job and Polish girls on another job. If possible, watch groups according to educational background. If you put a couple of college girls with a bunch of non-college girls, for instance, you run the risk of having cliques—and hard feelings. This is important in handling men too, but women are even more touchy when put in a situation where they feel inferior.



Women want to be judged on the merits of their work. They dislike patronage. This is Miss Edith Whitmire, adjusting parts in jigs for grinding at American Car & Foundry tank plant.

Another thing. Women like admiration but they prefer to be respected for what they can do. Often a shop foreman acts surprised when a woman does anything well, and nothing in the world aggravates a woman so.

"Look," he'll say, "she does that job all right—and she's a woman too."

It's the same attitude a man would have toward a youngster of 5 who happens to do something cute. It smacks of paternalism and condescension.

Women dislike it as much as they dislike the familiar attitude some men take with women workers. A woman worker wants an understanding attitude, and she'd rather be told she's incompetent if she is, and to have her competence recognized for what it is worth to the company.

In setting up supervisors, it's important to pick men who have the right attitude to begin with, or to train them in the right attitude from the beginning. On the whole, women work better for men bosses who respect their ability, than they will for women.

Often they learn better from women. There's some connection between this and the fact that women become discouraged more quickly than men do. If you can, train your women in groups and use women trainers. A good sound training program will pay dividends. Not the kind of job training done in some companies, where the new worker simply watches an experienced one and picks up what she can on her own. For women workers, that's fatal. Many women get so disheartened under such treatment that they will not report for work the next day. Perhaps they won't even come back after lunch. It's amazing how fast they disappear, under treatment that makes them feel inferior.

Of course, it may be necessary to use your foremen for training. That's possible too, if done carefully, as indicated in one plant manager's comment:

"At first our foremen were afraid to train women. When they had J. I. T. training, however, they became a lot more confident about it. Here is a training method that applies to anyone and that gets results with women as well as men.

"J.I.T." or Job in Industry Training is a 4-step plan worked out by the War Production Board, which can be

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Women in shops prefer sensible clothes—but they like some choice even there. Miss Frances Lucchese, who inspects small precision parts in one of American Car & Foundry Co.'s tank building plants borrowed the white coat for the occasion.

applied effectively to any job on the production line, to a new man or woman worker.

It incorporates the best that is known about training and insures the new worker's understanding of exactly what he is supposed to do—and why careful, exact work is vitally important. The friendly approach used in the "J.I.T." plan, wins loyalty and cooperation as well as performance. The plan is available to any plant working on war contracts, free of charge. Just let the War Training Department of your area know you are interested. They will answer any questions you may have, and arrange for your foremen to get the necessary instructions as soon as possible.

Studies show that the general run of women are not so good at mechanical work. Women engineers are scarce, not only because women are not trained that way, but because they are not inclined that way. Salesmen know that

the way to sell an electrical appliance to a woman is to tell her;—"You don't have to do anything but push a button." However, some women do have excellent mechanical ability, and it is wise to use aptitude tests to discover which ones do.

Monotonous, routine tasks, however—at these the average woman is much better adapted than are men. At manual tasks she has more manipulative skill and shows up significantly better on tests. If you can, de-skill your jobs. Here, for instance, is a lathe on which surfacing must be done. A man could be given the job of setting up the lathe. Then teach a woman how to take off one cut or two cuts, and train another woman to take the next operation. Trainers who have tried to make all-around machinists of women have not had much luck. On one operation, however, a woman can learn to do as well as the average man. Production generally is likely to be better. This is an extremely important point to remember in setting up jobs for women.

Another very significant difference between men and women—women are much more concerned about cleanliness and tidiness. Men are not too concerned if the floors in washrooms are dirty. For women you must have clean washrooms and restrooms, plenty of mirrors, and clean, fresh workrooms. The controller for a chain of department stores tells a story that illustrates this point. The store management wanted to put in some escalators several years ago, to increase store traffic and business. One of the men in the firm suggested that he felt the money would be better spent on some fancy powder rooms. The management decided to experiment with both ideas. In one store they put in the escalators. In another they built the lovely powder rooms—and found that traffic in that store increased to a significantly greater degree than in the store with the escalator.



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DoAll MIRACLE GRINDER

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Work is visible at all times, being perfectly lighted by a cool, fluorescent bulb located under the wheel cover.

Adaptable to either wet or dry grinding, the DoAll Grinder comes in two sizes, with 7" or 10" wheel.

Write for interesting literature about this better grinder.

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WHY THIS
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**OVER
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TON**



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**1140 Sq. In. of Bearings
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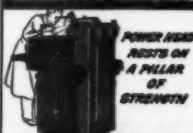


DIRECT DRIVE



**4 BALL BEARINGS IN SPINDLE
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MASSIVE COLUMN



**POWER HEAD
RESTS ON
A PILLAR
OF
STRENGTH**

PROTECTIVE SADDLE



**MECHANISM
IS
FULLY
SEALED**

NEW HYDRAULIC DRIVE



Who ever heard of a man going to one store rather than another because it had nicer washrooms? But any department store manager will tell you that facilities of this kind are important. Women have actually gone from one factory to another because of more attractive rest room facilities. Whether they are required by law or not, it is good business to have attractive rest rooms and wash rooms and to have rest periods set up so that the women workers can use these facilities to a greater extent than men would under the circumstances. Studies show, too, that production may increase 12-15 per cent with regular rest periods, on all jobs requiring continuous sitting or standing. Rest periods are particularly effective if they can be spent in a quiet environment, with plenty of fresh air, and with an opportunity for light refreshment.

Can women handle as heavy jobs as men? Experience shows that women are weaker physically than men, both per pound and per individual. Take a 150 pound man and a 150 pound woman, and the man almost invariably will be able to lift more. In England, women were tried on jobs requiring continuous lifting and carrying. They did those jobs, but found that the strain and physical impairment were great. Since then English industrial firms have developed special jigs and gadgets to assist women workers in handling heavy pieces.

The matter of uniforms for women is recognized pretty generally by this time. Women can't run around machines with skirts and sleeves and frills. They must have their hair protected so it will not get into machinery. In some plants, the girls have voluntarily adopted a uniform type of slack suit in red, white, and blue — blue slacks, red suspenders, and white blouses. On the whole, however, it has been found have that it is better to

have two or three uniforms from which to choose. Letting women have their choice of uniforms helps them to get away from the feeling of being regimented, gives them the feeling of expressing their individuality. Men don't mind dressing exactly like some one else—but women do. If you employ many women, it would cost no more to have a choice—and it would mean a great deal in stepping-up morale.

One last point—women do have a good influence in the shop. A number of personnel men who have worked with them have found that it is wholesome for men and women to work at the same kind of operations together. Conversation in the shop is more wholesome. Production steps up.

Women do contribute something worthwhile to industry in the war situation. Treated fairly and with understanding they can play an important part in keeping up the production levels required to make the war effort count.



As a rule, women can be trained more easily by women—but they generally do better work with men bosses. (American Car & Foundry photo).

New HALCO UNIVERSAL HEAD

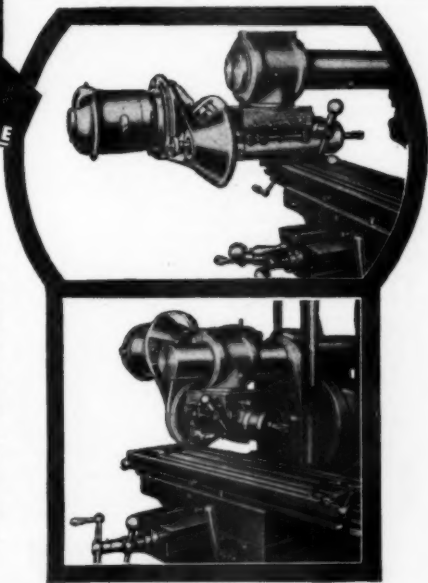


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#6 Warner-Swasey Turret Lathe (1083)



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**... Lean them against
each other in a corner**

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with your Broaches-----*

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IT TAKES time to recondition a damaged broach. Careless handling of your broaches may tie up production. Here are a few good rules to follow to protect these vital war tools:

(a) Always provide individual storage racks for broaches. These should either be of a material that will protect the teeth from damage or else should be lined with such material. If cutting edges of broaches are allowed to strike against each other they may be chipped or nicked.

(b) Never drop a broach on any hardened surface. Broaches are usually made of high speed steel and may even be tipped with tungsten carbide. You may chip, nick, or even break the teeth.

(c) When broaches are to be stored for any period of time they should be treated to protect them against corrosion.

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WITH NO "LAND"

ONE MACHINE • ONE SET UP •
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1. Dress the face of the grinding wheel so it has exactly the same curve as the tool to be ground.
2. Offset the tool from the center of the curve of the wheel to give desired clearance.
3. Grind clear to the cutting edge.

THIS IS ALL DONE IN ONE OPERATION

Because the tool has been ground with the circular relief exactly the same as the curve of the tool, the outside of the tool is left convex. Therefore, all the metal possible has been left behind the cutting edge to give it maximum support, and the tool longer life.

The degree of clearance is determined by the distance the tool is moved in or out against the curved face of the grinding wheel.



COMPARING CONVENTIONAL GRIND
WITH CIRCULAR RELIEF GRIND



WRITE FOR COMPLETE DETAILS

THE CLEVELAND TOOL ENGINEERING

9200 DETROIT AVE. CO. CLEVELAND, O.

Carbide Dies for Tube Drawing

By EARL GLEN*

WITH the necessity for increased rate and quantity of output in the production of tubing, a widespread increase in the use of carbide dies and mandrels for tube drawing has been evidenced recently. Such dies and mandrels are being used today for drawing tubing as small as 0.013" (for hypodermic needles) and as large as 3½". Even larger sizes of tubing are now possible with the provision at Carboly of equipment for manufacture of large diameter dies and mandrels.

Primary advantages of carbide mandrels and dies compared with steel or chrome varieties are:—(1) Longer die and mandrel life. (2) Higher drawing speeds. (3) Lower cost over life of die.

Carbide die life, when drawing steel tubing, is measurable in millions of feet as against thousands of feet for chrome plated or straight steel dies. While life of the carbide mandrels naturally is somewhat shorter than that of carbide dies, their life compared with other materials is even more striking than in the case of carbide dies. Experience to date has shown an average carbide mandrel as having a life in excess of 200,000 ft., while some have run well in excess of half a million feet of tubing. This compares with around 10,000 to 20,000 feet for steel or chrome plated mandrels.

When steel dies are used, die wear increases rapidly with increased draw-

ing speeds. With carbide dies, however, experience has shown that higher drawing speeds are possible even with much of the older equipment. Usually tube drawing speeds run around 25 to 50 per cent or more in excess of those for the same job when using steel dies.

As to cost, it is generally estimated that a Carboly die pays for itself at around 200,000 feet of steel or brass tubing. This seems to hold true for most sizes. As a matter of fact, however, some carbide dies — especially when re-sized to draw progressively larger tubing than on the original run — now show production records well above 8,000,000 feet of steel tubing. On aluminum tubing, die life is even greater and the differential between carbides and steel even more pronounced.

On copper and stainless steel tubing, while total die life is shorter, the differential is also greater and the dies pay for themselves at considerably less than 200,000 ft. Stainless, as a matter of fact is almost universally drawn with carbide dies today, for this reason.

Some forms of copper tubing, particularly the nickel coppers in one to 2½" sizes as used for condensers, are also being drawn almost universally thru carbide dies today. Steel dies and mandrels apparently will not stand up

*Engineer Carboly Co., Inc., Detroit.

when drawing this extremely tough material.

For the drawing of common steel tubing, both carbide dies and carbide mandrels are being used increasingly today due—in addition to the higher drawing speeds and lower cost previously mentioned—to the advantages of longer runs before die change, decreased set-up time, better finish obtained and reduced die pick-up.

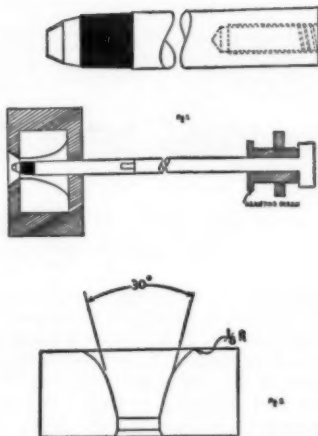
The better finish obtained, incidentally, is not an inherent characteristic of the carbide material itself. Just as a good finish can be obtained with steel dies when the production run is first started. The difference is that the finish soon deteriorates with steel dies while it is maintained over a long run with carbides.

Mandrels

Shown in Fig. 1 is a highly effective design of Carboloy mandrel for tube drawing. The carbide portion, shown in black, is usually tapered approximately 0.010" over the nib length. The purpose of this is to simplify reconditioning. When new, the tubing will hit the nib near the diameter over the entire nib length slightly. When re-applied, the tubing then hits the nib slightly farther back. The same process can be repeated until the maximum nib diameter (at the large end) is reduced below the minimum size.

While this design is apparently most effective in insuring long mandrel life, it does depend for its efficacy to some extent on the accuracy of mandrel adjustment available in the equipment. Usually, lengthwise adjustment of mandrels is either by screw or hydraulic mechanisms. Where proper adjusting means are not available, some companies use straight nib carbide mandrels.

These Carboloy mandrels are available in standard sizes running from 0.424 to 2.250", measured at the heel



SHAPE / STEEL TUBING "DRAW" DIE

DIE	APPROACH ANGLE	NIB DIA.	MINIMUM TUBING DIA.
1/2" x 1"	30°	1/8"	1/4"
3/4" x 1 1/2"	30°	1/8"	3/8"
1" x 2"	30°	1/8"	1/2"
1 1/2" x 2 1/2"	30°	1/8"	3/4"
2" x 3"	30°	1/8"	1"

diameter of the nib, with larger or smaller sizes available on special order.

Die Design

Carboloy tube drawing dies are designed to be used interchangeably with steel dies. There is considerable difference between die designs used to produce tubing by sinking and by drawing respectively, as shown in Figs. 2 and 3. Sinking dies are characterized by small approach angles and long bearings, whereas draw dies for steel tubing have a larger approach and a shorter bearing length. Draw dies cannot be used for sinking since the work would come out of the die undersize.

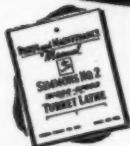
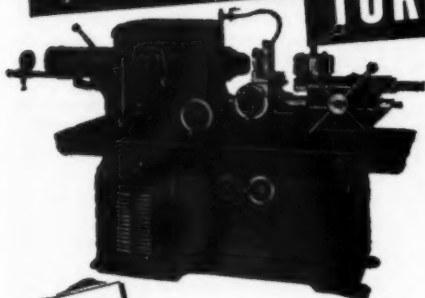
The reason for the long bearing in sinking dies is to help keep the tube round and straight. When the die wears, and tubing starts to come out oversize, it is necessary only to re-lap the die, sharpening the angles while

More Shells

for the 37's... with

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SIMMONS No. 2 Turret Lathes are being used in important war production plants all over the country—working on shells for 37 mm guns, turning out myriads of small parts for our fighting aircraft, performing a wide variety of bar and chucking operations that require high precision at high speed.

Designed for simplicity of operation, with a minimum of confusing devices, these Simmons Turret Lathes make it easy for even inexperienced operators to produce high-precision work quickly. For example, the Micro-Speed Drive offers unlimited speed changes and all variations can be made while the spindle is in operation. This enables quick selection of the speed best-suited to the work and cutting tools. A simple over-sized brake brings the spindle to rest quickly.

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SPECIFICATIONS

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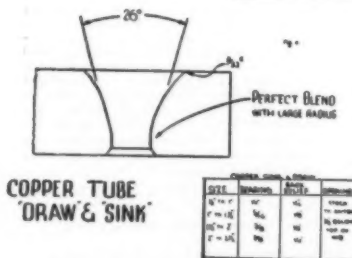
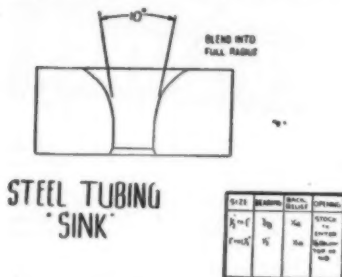
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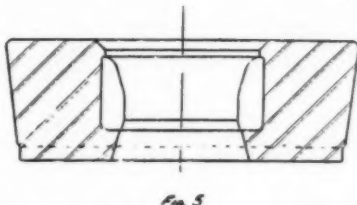


maintaining the same bearing length. The tubing then will come out to correct size again.

The use of large angles in carbide tubing-draw dies is based on the general practice of taking relatively large reductions per pass. With carbide dies, the usual practice is to reduce diameter approximately $\frac{1}{8}$ to $\frac{1}{4}$ " per pass, although there are successful installations where, say, $2\frac{1}{8}$ " tubing is produced in one pass from 3" stock. In draw dies, bearing length is not particularly important since most of the "wear" on the die falls in the approach angle section at the point where the diameter of the opening corresponds to the diameter of the stock being drawn.



There is considerable difference in design also between carbide dies used for drawing steel tubes and those for drawing or sinking tubing of copper as will be noted from Figs. 3 and 4. Dies for copper represent a cross be-



tween steel tube sinking and steel tube drawing dies. To avoid chatter, the approach angle in such dies is blended into the bearing with a large radius. This is not the case with steel tube draw dies. For copper, there is little difference between drawing and sinking dies and these may be used interchangeably.

Cases for carbide tube drawing dies are generally of tapered design (see Fig. 5). This insures firm seating of the dies, permitting smaller die depths to be used, with consequent ability to shorten the length of tube to be pointed. It also makes a backing plate unnecessary. The undercut shown on the die case in Fig. 5 is provided to simplify chucking when reconditioning dies.

Die Reconditioning

Usually when carbide nibs wear oversize in draw dies, the practice is to re-cut the nibs up to the next larger tubing or draw diameter. When sinking dies wear oversize, the usual practice is to sharpen up the angles, bringing the work back to size again, since the diameter of the work, in sinking, is dependent more on die angles than on die size—with the tendency for the work to run toward the small size.

Die Selection

Since carbide dies can be reconditioned fairly simply today with standardized equipment available from carbide die producers, most mills recondition their own tube drawing dies. An added advantage of such a pro-

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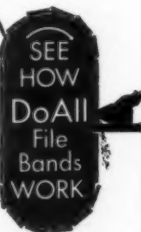
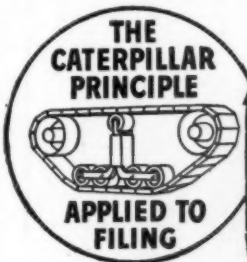
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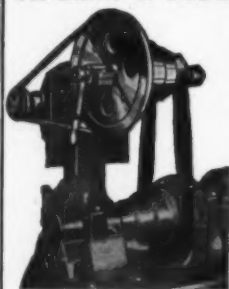
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cedure is that it permits the mill to purchase tubing dies in rough cored or drilled form, for finishing by the mill itself, thus materially reducing initial die cost.

Selection of die sizes when tooling with carbides depends on mill conditions. For dies above 1" it is normally most economical to figure on one or two re-cuts to larger sizes. Mills not having larger sizes to run would find it most economical to purchase dies at their maximum size, of course.

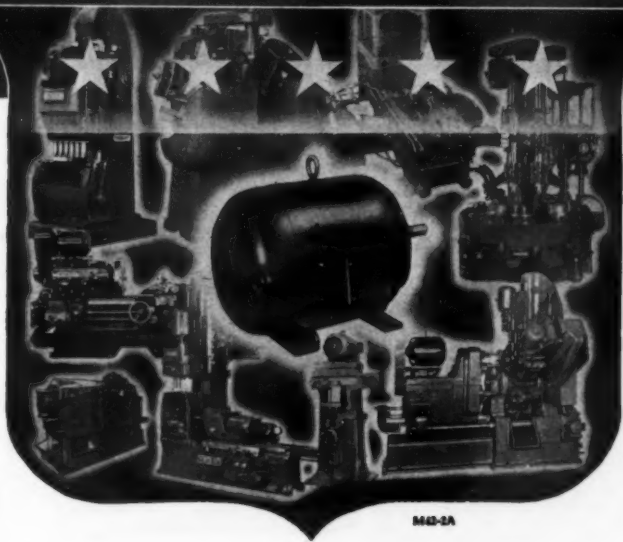
Lubrication

Fundamentally the better the lubrication and the lubricant, the longer the die life. Apparently carbide dies are not very critical, however, as to the method of applying the drawing compound. There is little difference in this respect between carbide and steel dies, and practices differ rather widely. In some mills, tubes are dipped in the compound before drawing. In others, a stream of compound is directed right at the die while mandrels are drilled to lubricate the ID of the tube under pressure as well as the OD. In some mills a concentrated form and in others a dilute form of dope is used—all with apparently equal success.

War Shipments Pictured

Well illustrated and informative, issue No. 8 of Acme Process News, shows how a wide variety of war shipments are protected in transit. Included are details of the strapping of such items as lend-lease food supplies, cranes, candy, bricks, furnaces, cargo trailers, textiles, medical supplies and other products. Another article reveals how one manufacturer, faced with a shortage of bolts, was able to cut that particular cost by 86%. Women operators of strap-applying equipment are illustrated on one of the pages and should be of special interest to manufacturers who are considering employment of female help for strapping shipments. Copies of this and succeeding issues may be obtained direct from Acme Steel Co., 2821 Archer Ave., Chicago.

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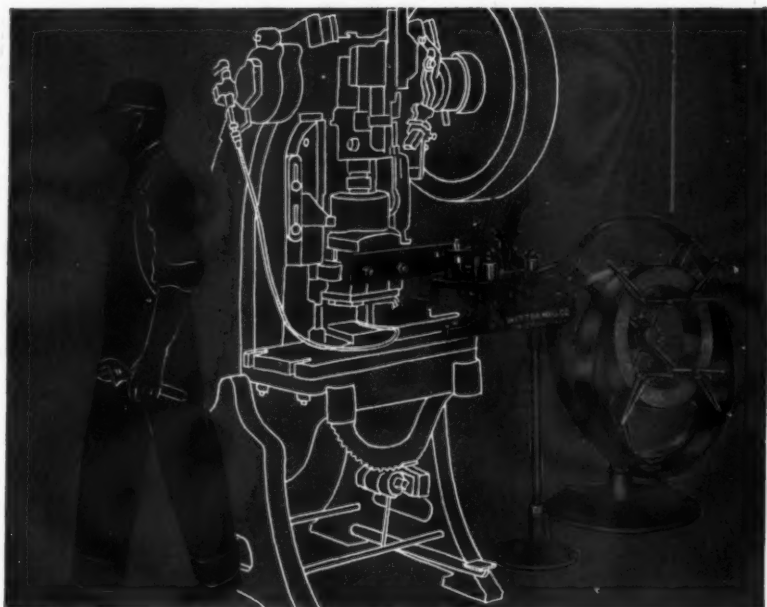
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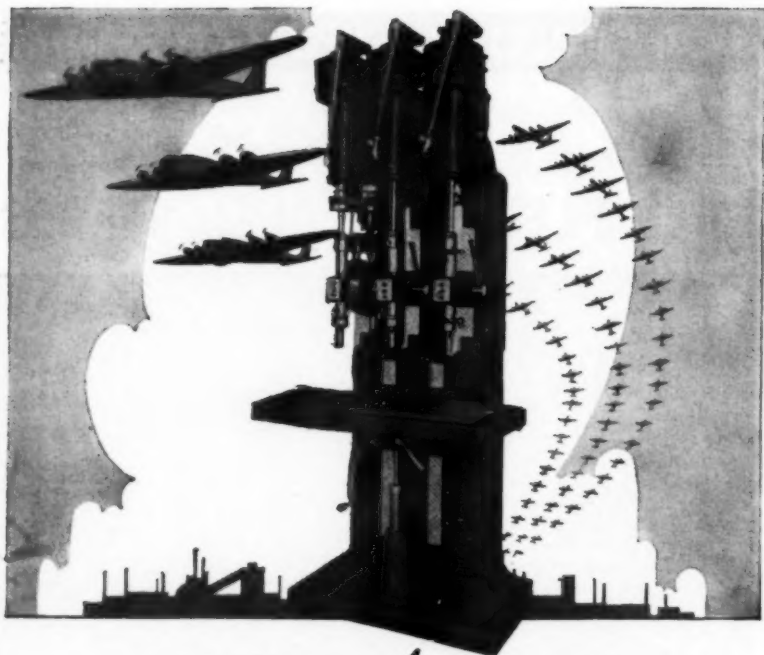


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Aspects of Modern Milling

(Part III)

By JOHN E. HYLER

IT is not possible to estimate accurately the degree of efficiency that has been added to milling machine practice as a whole, thru the use of improved cutting tools, but it is known to be very great. Once a given firm has started to use high speed steel instead of carbon, you will find them holding closely to the better steel, or going on to other cutting materials that are still better for certain specific uses. It is seldom indeed that they will ever go back to the older types. Especially in times like these when speed is vital. The same is true after a man has commenced using carbide tools as in face milling, for instance. It is necessary that careful attention be given to the grinding of carbide tools, but explicit directions for grinding and handling are available, and standard or converted standard tools may be used in any good inserted-tooth facing mill.

For those who like cutter material with greater wearing qualities than high speed steel, and yet do not care to go in strongly for tungsten carbides,

materials have been developed which fit right in between. These are better in case the tools must be used where operating rigidity is not quite everything it should be. I certainly do not advise the use of milling machines that are badly worn or that lack rigidity for any other reason, but it is interesting to know, in case of emergency, there are materials that will stand shocks somewhat better than the tungsten carbides. These special alloys are available in a wide variety of tipped tools suited to milling purposes, and are known by the trade name of Speedaloy. Rexalloy is another popular material suitable for use on alloy steels with a chromium or nickel content.

We have all heard that there is at present a tungsten shortage. Just how serious that shortage may be, I do not know, but I do know that in many cases the amount of tungsten used can be lessened in cutting tools, without serious effects, by the inclusion of other materials in suitable proportions.



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Take, for instance, a special type of high speed steel which features the use of molybdenum. Makers of this tool steel, which carries the name of Mo-max to remind us of "moly," claim that less than 2% of tungsten included, together with the molybdenum, has produced tools showing much greater efficiency than some milling tools incorporating 18% tungsten. If that be true, and there is no reason for doubting, it means inevitably that molybdenum will have an increasingly important place in modern milling practice.

Time-honored and time-established theories are upset now and then in every field, and in some cases it is found so in milling machine practice. Always, we have been taught that milling cutters must have a certain forward pitch to the tooth faces, otherwise known as a rake angle, to give them the proper bite into the material being machined. We were told and taught that this rake angle varied for different materials being machined, running the gamut from 20 degrees for mild steel or malleable iron all the way down to a 6 or 8 degree angle for certain nickel chrome steels.

Now comes a process (and one established in actual practice) that shatters our thinking in regard to rake angles on milling cutters. A certain tool-tipping material known as Firthite is used in connection with the process, which actually contemplates the use of a 10-degree negative rake angle, in connection with a negative helix angle, for milling alloy steels. This is, you will understand, of the nature of a scraping cut, and the face mill so designed and fitted is operated at a very high speed, about 10 times what the ordinary face mill would run on any given job. The remarkable thing is that the feed may be greatly increased (tho not in full proportion) as to relative rotary speed of the mill-

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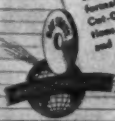
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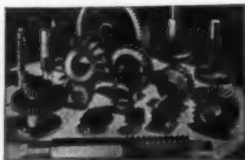
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ing cutter) and much higher production realized.

Metal Specialists Sometimes Furnish Heads

It is not at all unusual that those who have gone to considerable expense in the development of high grade cutting materials, should be desirous that the tools be used under the conditions most favorable to maximum efficiency. In some cases, I find that in order to accomplish this, man-

ufacturers of milling cutter materials have furnished heads for the use of those same materials. This allows them to incorporate just the rake angle and the helix angle, in the case of facing mills, that have proven best with their materials. One manufacturer of a very high grade steel-cutting carbide, known as Kennametal, also furnishes facing heads known as Kennamills to carry the tools. Facing heads for both roughing and finishing cuts are furnished by this maker, the finishing heads having a greater positive rake angle, and a greater negative helix angle, than is used for roughing heads.



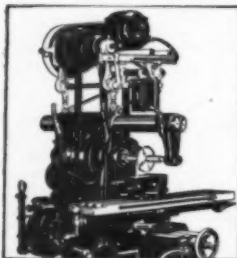
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Possibly one of the main factors which has operated in the past, to prevent users of various types of milling machines from stepping over to the use of better cutting materials, has been the thought of tool-changing frequency. A man reasons on his particular milling machine, there are so many tool changes and setups that much of the time is inevitably setup time. Therefore he may doubt whether or not he can reap the advantages of better cutting materials sufficiently to justify the investment. Under the old regime, that was true to a considerable extent, but it has been exploded as a theory by many who do have many changes to make, and who employ suitable adaptors for the making of quick changes.

Such adaptors are profitable both from this standpoint and in their own



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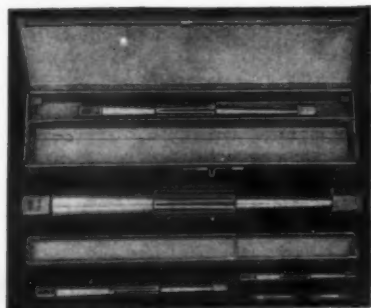
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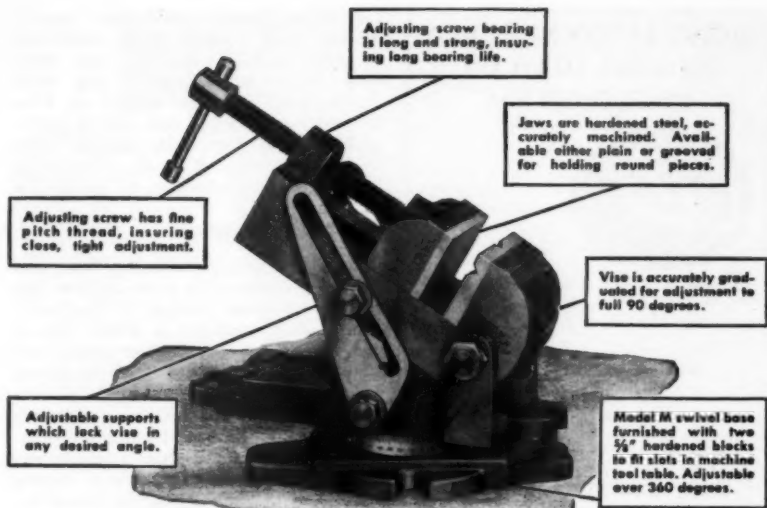
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right. As furnished by one outstanding builder of milling machine adaptors, there is provided in some cases a chuck which may be permanently installed. This is particularly suited for receiving various adaptors to go with it. It is claimed that some of the tool changes may be made readily in 5 seconds. Think it over. How many changes can you make in a working day without seriously extending your running time?

Even in cases where the margin of time saved thru the use of carbide tools is not great, the fact that there is a margin saved is now sufficient argument, under the stress of wartime demands, to cause many manufacturers to swing over to carbides when available to them. Milling machine cutters, tipped with tungsten carbide as furnished by representative makers, should always be considered carefully, especially by those equipped with high grade milling machinery that is relatively vibration-free, before electing to continue with a less productive cutting material. Some firms have them available promptly, in styles and grades suited to nearly any machining need or problem.

"But," says someone, this is all fine with reference to surfacing and straight cutting problems as they relate to the milling machine, but how about the use of tungsten carbide in the making of various cuts that cannot be handled with any standard tool?" True, that angle is also important. You may be sure that this end of things has had careful attention, tho those who have given it attention might be regarded as cutter designing specialists. For such tools, designed from a description and an analysis of the particular cutting conditions to be met, very often call for the consideration of special factors, which are not involved in the making of milling machine cutters from the ordinary standpoint. One firm I know,



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furnishing formed and other special milling tools tipped with tantalum tungsten carbide, employs men with very broad experience in just such applications, and one cannot do better, when confronted with special problems, than to turn them directly over to such a firm. It is the short way to maximum production in practically every case.

Tool Steel Specialists

It is not infrequently the case that shop management is more or less "up a tree" in the matter of the right tool steel to use for a given type of milling cutter, or even for other types of cutters. Sometimes it seems almost a toss-up between one form of cutting material and another. In such cases, it is really best, lacking the presence of men in the shop who are experts on different steels and cutting materials, to submit your problems exactly as they are to steel specialists. Remember that such firms have a reputation to establish and sustain. That fact is a safeguard against any chance they will take your problems under advisement in any hap-hazard manner. As one such tool specialist has aptly put it:—"So much depends upon so little," when it comes to the selection of a proper tool steel. The "little" is just the thing that is likely to be overlooked by the novice.

One factor you will be likely to discover, if you set out to study the use of various cutting materials versus materials to be cut, is that certain materials generate far more heat than others in the machining process. Stainless steels offer a problem in this respect, and there are other materials distinguished by their high degree of heat generation. When you are machining such stock, you will do well to consider the use of a cutting material that has shown more than ordinary efficiency on just such work. One such is a non-ferrous material,

SPECIFICATIONS

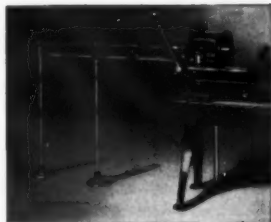
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NO. 830 LOGAN 1/2" CAPACITY HAND SCREW MACHINE

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The recently announced Logan Turret Lathe was developed to supply the demand for a durable small hand screw machine capable of accurate, continuous production. Small parts made from bar stock of 1/2" diameter and less can be turned out with the same speed and precision as that of larger machines and thus release the latter for heavier work. Built to rigid and exacting specifications and the same high standards as the other lathes in the Logan Line.



The Logan Bar Feed is offered as an accessory for the No. 830 Hand Screw Machine. Maximum capacity 1/2" round stock. Maximum stroke 2". Patented safety cam action locks collet and operates bar feed.

LOGAN ENGINEERING COMPANY • Chicago, Illinois

Logan
A NAME TO REMEMBER WHEN YOU THINK OF LATHES

made up of chromium, cobalt and tungsten. It has a very high degree of stability and hardness even when it becomes very hot in the machining process. Designated as Rexalloy, this material is claimed to show increased cutting speeds over high speed steels on various materials, making its best showing on materials which generate a high degree of heat.

So great has become the interest centered around better cutting materials that one outstanding maker of tools, who had for years been called upon to furnish cemented - carbide tipped tools as applied to milling machines and other purposes, found it necessary to expand their facilities in this direction. The decision to do so led to the formation of a separate division of their business, just to take care of the demand for such tools, and a name was adopted which adequately marks them as cemented carbide specialists. This firm supplies cemented

carbides of a number of the types mentioned in this article, such as Vascoloy-Ramet, Carboloy and Firthite. They stock a very complete line of all that might logically be called standard tools. An advantage of dealing with such a source of central supply is that they have the various different carbides available at hand, are not interested in pushing one more than the other, and are in position to give unbiased information as to which one is superior for any given job or application.

Carbide milling tools of any kind will need to receive careful treatment in grinding and lapping. The highest class milling machine operators have always held that even in the case of ordinary carbon steel or high speed steel cutters, it is important to get a good polish on the tools after grinding. This helps the tools to clean themselves of chips more readily, and prevents chip-clinging. Carbide tools

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Make your rough cuts within thousandths of an inch! Save precious machine time, save valuable steel. A Kalamazoo Metal-Cutting Band Saw gives you this kind of accuracy to boost production! Sturdy design, ball-bearing construction, hydraulic controls. Completely portable—saves set-up time. Cuts all shapes!

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deserve far closer attention than ordinary types of tools, and you will do well to see that they receive it. Properly used carbides will give you higher production on your milling machines.

Grinding machines particularly adapted to the grinding of carbide cutters are on the market, and should be used for the purpose. Some of these have motors directly mounted on a double-end spindle, and a wheel at one end for rough grinding, with the finishing wheel at the other. As a final touch for your carbide tool edges before putting them into operation, you will be interested to know that there is a special diamond lapping oil available which will help you to give them a far better finish.

EDITORIAL NOTES:

Carbology tools are sold by Carbology Co., Inc., 1139 E-8 Mile Ave., Detroit, Mich.

Speedaloy as mentioned descriptively may be had from Circle Tip Tool Co., Inc., East Orange, New Jersey. Rexalloy is supplied by General Tool & Die Co., 62 Franklin St., East Orange, N. J.

Cutting material known as Mo-max with molybdenum content is a product of the Cleveland Twist Drill Co., Cleveland, Ohio.

Kennametal and Kennamills are developments of McKenna Metals Co., 300 Lloyd Ave., Latrobe, Pa.

The milling machine adaptor sets, making for fast tool changes, are made by Milling Machine Adaptor Corp., 1400 West Fort St., Detroit, Mich.

The firm mentioned which keeps carbide tools available for quick delivery in nearly

all forms for needed machine operations is the Tungsten Electric Corp., 562 39th St., Union City, N. J.

Formed and special milling cutters, tipped with tantalum tungsten carbide, are furnished by Vascology-Ramet Corp., North Chicago, Ill.

Another firm which furnishes tungsten carbide cutters in many forms is the Super Tool Co., 21640 Hoover Road, Detroit, Mich.

A tool steel specialist always ready to make helpful recommendations is the Jessop Steel Co., Washington, Pa.

Willey's Carbide Tool Co., 1344 W. Vernor Highway, Detroit, make many types of tools.

Firthrite as described for negative-rake-angle face milling is sold by the Firth-Sterling Tool Co., McKeesport, Pa.

The tool firm which supplies cemented-carbide tools made of carbides from different firms, and which has established a special division of their business for the purpose, is Carbide Fabricators, Berkley, Mich. This firm is a subsidiary of the Morse Tool Co., Detroit.

The carbide tool grinder descriptively mentioned is one made by Thomas Prosser and Son, 120 Wall Street, New York City. Other excellent grinders are made by Hammond Machinery Builders, Inc., 1614 Douglas Blvd., Kalamazoo, Mich. Ex-Cell-O Corp., Detroit, Mich., Criterion Machine Works, Beverly Hills, Cal., K. O. Lee & Son, Aberdeen, S. D., Wm. Sellers & Co., Philadelphia, Pa., Standard Electrical Tool Co., 1954 W. 8th St., Cincinnati, O., Cincinnati Electrical Tool Co., 2702-9 Madison Rd., Cincinnati, O., T. C. M. Mfg. Co., Harrison, N. J., Willey's Carbide Tool Co., 1344 W. Vernor Highway Co., Detroit, Mich., Baldor Electric Co., 4368 Duncan Ave., St. Louis, Mo., and others.

The diamond lapping oil mentioned as applicable for lapping carbide tools is furnished by Stadol Mfg. Co., 617 South Beacon St., Dallas, Tex.

A very helpful book on the manufacture and maintenance of cemented carbide milling cutters has been issued by Cincinnati Milling Machine Co., Cincinnati, O.

BUY WHITNEY-JENSEN METAL-WORKING MACHINERY and HAND TOOLS for LONG LIFE and ACCURACY **AIRCRAFT RIVET SQUEEZERS**

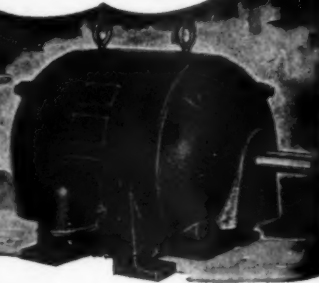
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Standard type shown. These jaws made in 10 sizes from 1 1/8" to 12" throat depth. Write for Catalog,

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The LIMA Type RS is built in sizes from $\frac{1}{2}$ to 75 H.P. brake test. Is adaptable to production lines, individually operated machine tools and general manufacturing locations where totally-enclosed motors are not especially needed. The Semi-enclosed DRIP-PROOF feature affords maximum protection against chips and filings, dripping or splashing liquids so destructive to open type motors.

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Large enough to successfully serve you, yet small enough to give personal attention to your needs.



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YES, it's true ! Although we're rushed with war work and civilian production you can depend on prompt deliveries of standard models.

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THE Vernon 12" precision Shaper is engineered for smooth performance. Many advanced features and craftsmanship in construction guarantee satisfaction from the start. For example, Timken tapered roller bearings and ball bearings throughout cut friction losses, preserve life and accuracy . . . Careful hand scraping provides accurate, wide bearing contact between all sliding surfaces . . . And smooth chatter-free ram motion is transmitted by adjustable helical bull gear and pinion. For additional power back-gears are provided. Any speed between 15 and 160 strokes per minute may be selected by means of the fully enclosed variable drive. The Vernon is the outstanding buy in a low-cost shaper! Available at any one of Vernon's 70 national distributors. Early deliveries on orders placed now!

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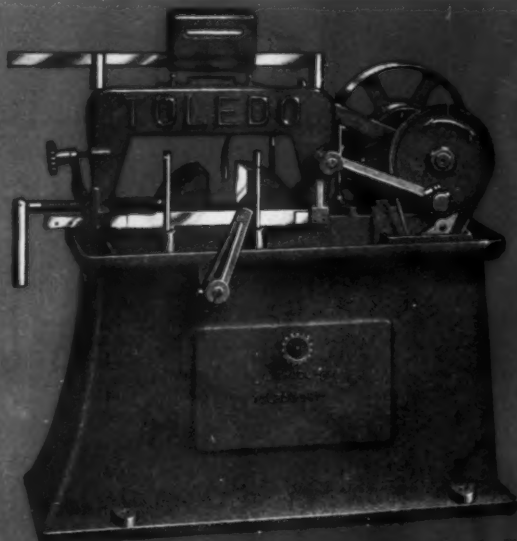
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IMPROVED DESIGN — HEAVY DUTY — FAST CUTTING. A REAL SAW THAT WILL SAVE YOU TIME AND MONEY.

To start cut, relieve weight of saw frame, hold down on release lever and lower saw to work — start machine. Automatic trip stops the machine on completion of cut. Automatic relief of saw blade on the non-cutting stroke is also provided.

Capacity 6"x6" with 10" to 14" blades — Clutch Pulley 12"x3" — Speed of Pulley 120 r. p. m.



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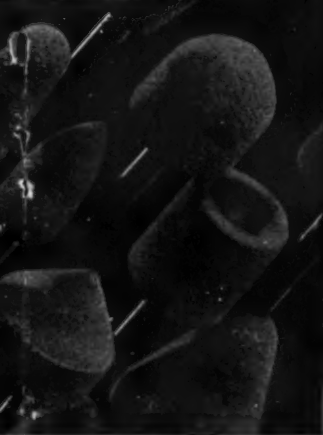
They're **TOUGH** and **DO** their **STUFF!**

● Commandos of the grinding wheel industry—the first small wheels mounted on steel shanks and leading the way today with smoother, more rapid grinding, polishing and finishing of difficult jobs.

Chicago Mounted Wheels—the result of 45 years of **KNOW HOW**—come in a wide range of styles on different size shanks, for use with any portable or flexible shaft grinder. Several special-formula abrasives give 150% to 300% longer service. More than 200 shapes, all mounted and rarin' to go.

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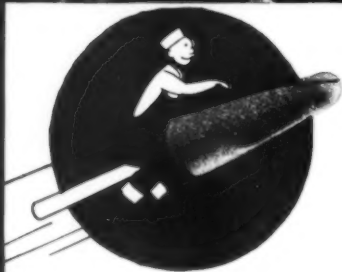
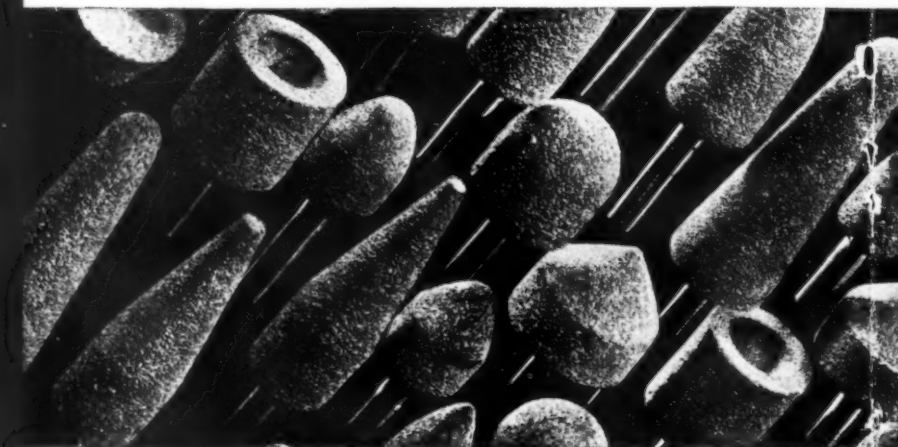
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and you without
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Here's a real pro-
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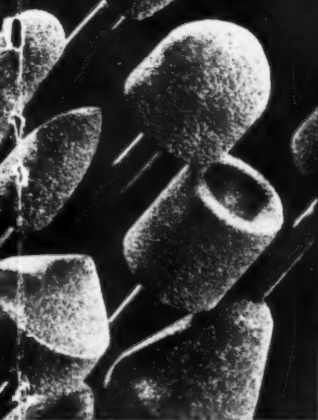
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SELECTIVE SPEED TRANSMISSIONS

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WELLS METAL CUT-OFF SAW

SERIES 80



SPECIFICATIONS:

Capacity: Rectangle . . . 8" x 16"
(spec. bowed guides) . . . 5" x 24"
Rounds 8" dia.
Speeds: ft. per min. . . . 60, 90, 130
Motor . . . Specifications are optional

Not a new Cut-Off Saw, but an improved one—a Cut-Off Saw which embodies all the worth while improvements and features a metal cutting saw should possess.

For sixteen years Wells has been occupied with the task of building better saws and here is the latest design—an accurate, durable and economical continuous cutting machine tool.

Base or legs optional.

A large stock of blades is available at all times. Write today for full information and specifications.

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Wells METAL CUTTING BAND SAWS

DO YOU NEED ANY OF THESE PRODUCTION TOOLS?

You can get them promptly on
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<p>★ STEEL BURS AND DRILLS</p> <p>Wide variety of plain, cross-cut and finishing Burs of highest quality — accurately made, expertly hardened and sharpened. Also, flat spear point, square and Twist Drills.</p>	<p>★ ABRASIVE TOOLS</p> <p>Abrasive Points, Disks and Wheels in a large selection of shapes and sizes. Made in abrasives for hard and soft materials. Also, Mandrels, for mounting disks and wheels.</p>
<p>★ FLEXIBLE SHAFT TOOLS</p> <p>Small portable flexible - shaft - driven outfits for die - sinking, grinding, drilling, boring, reaming, polishing and a hundred other jobs. Operate on 115 V, AC or DC.</p>	<p>★ FLEXARMS</p> <p>Complete flexible shaft Arms for use on any spare motor. Arms include ball-bearing motor coupling, flexible shaft and casing and industrial handpiece. Types for light and heavy duty.</p>
<p>★ INDUSTRIAL HANDPIECES</p> <p>Finest quality Handpieces for flexible shaft driven tools in types for light and heavy work. Also right-angle Handpieces.</p>	<p>★ OTHER TOOLS</p> <p>Small Motor Bench Lathes . . . Brush Wheels . . . Rotary Files.</p>

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 Illustrations and specifications of all equipment listed are given in this catalog. Copy, with Price List, mailed to you on request.

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INDUSTRIAL DIVISION

Dept. H, 10 East 40th St., New York, N. Y.

FLEXIBLE SHAFTS for POWER DRIVES, REMOTE CONTROL and COUPLING

A Manpower Inventory—NOW

By Major General Lewis B. Hershey, U. S. A.
Director of Selective Service

MANPOWER is a most important strategic material of today. Every employer should make a prompt inventory, appraisal and analysis of the manpower in his own plant as he would inventory his stock pile. In order to keep production going and at the same time furnish men for the armed forces, industry should now establish an orderly replacement program.

In order to obtain temporary deferments for essential men while training women, young men, older men, and physically handicapped or those with a high degree of dependency, the employer should know the fundamental principles in the operation of his local Selective Service Board. Certain steps should now be taken by each employer. He should know how many men on his pay roll are between the ages of 20 and 45. He should investigate the classification of every one of those men. On the basis of such an inventory, he should prepare to plan ahead and train men for replacement of those who must necessarily enter the armed forces if we are to have the sort of army which can win the war.

Deferments Temporary

Deferments, granted so that employers may train women or men not liable to early induction, are temporary deferments; they cannot exceed 6 months and in many cases may be for only 30, 60, or 90 days. The Army today has to train a bomber pilot

within a period of 8 months to operate a very technical machine with an instrument board which puzzles an expert. Why, therefore, should industry insist that it can take 2 or 3 years to train men for industrial tasks not nearly so complicated?

The fundamental purpose of every deferment of a registrant is to allow an employer to train a replacement. Only in a few rare instances can an employer expect to have these temporary deferments continued for more than the 6 months' period. These are only in cases where an abnormally long period of training is required for a replacement and the 8 months needed, in which a bomber pilot can be turned out now, is something to remember in this connection.

Employer's Responsibility

Employers may seek the deferment of their necessary men with or without their consent. Here is how they go about it. On page 3 of the Selective Service Questionnaire (Form 40) which is sent to each registrant before he is classified is the following:

Instructions:—If your employer believes that you are a necessary man in a necessary occupation, it is his duty to fill out form 42A requesting your deferment. You may also attach to this page any further statement by yourself which you think the local board should consider in determining your classification.

Such statement will then become a part of the questionnaire.

This is on all the questionnaires distributed during the past 6 months. The fact that the Selective Service System now specifically mentions the filing of Form 52A as the manufacturers' duty is a clear indication of the Selective Service System's view on the responsibility of each employer in this matter.

The employer can obtain Form 42A at the local board and the local board will consider the employer's request when the form is properly filled out and signed.

If such request should be denied because the man, after consideration of the claims offered for him, is not considered indispensable to the company's operation, and is needed more in the armed services, the local board will advise the employer of its refusal of such an occupational deferment.

The local board does this by sending to the employer, at the same time it notifies the registrant of his classification, a Form 59.

May Make Appeal

There are 10 days after Form 59 is mailed by the local board to the employer during which the employer can appeal the registrant's case. The registrant will not be ordered to report for induction during this 10-day period.

In order to take an appeal, the employer simply has to sign his name to Form 59 which he has received, and return it to the local board; or in case the Form 59 is not received from the local board, any written request will have full value to make such an appeal effective.

When Form 59 is returned by the employer, the appeal procedure becomes automatic. All necessary forms are available at the local board in the employer's immediate vicinity or at the office of the State Director of Selective Service.

If the local board and the appeal board deny the appeal for the occu-

pational deferment of a key man, the employer may then bring the matter to the attention of the State Director at the State Selective Service Headquarters, with the request that the case be reopened or appealed by him to the President.

Definite Duty

A double duty rests upon the employer. He should personally know what his manpower situation is. He should not leave the job to a minor employee to decide who is necessary. The employer who delegates the task of filing a request for deferment to a clerk, or the executive who does not make a complete inventory of his whole plant today, is negligent. Likewise, the employer who files requests for deferment of men who can be replaced by women, or others, is keeping reinforcements out of an Army which is battling for us all. The employer engaged in essential war production, who has been required to expand his plant greatly and who then fails to request deferment for his key men is also negligent.

A good rule to follow:—Don't ask deferments for any men who can be replaced by training another individual not likely to be eligible soon for service in the armed forces.

Make an inventory, request deferment for any man whose immediate going into the armed services would retard production of vital war material or other services essential to the war effort, or who is needed to maintain national health, safety and interest.

Only when an employee is working in a critical occupation within an essential industry should a Form 42A be filed for his temporary occupational deferment.

Make Replacements

Yes, an inventory within a man's own plant is called for; also an appraisal and analysis of the manpower in the community. There is many a man over 45, or a man physically hand-

*The Tool of Peace
goes to War....*



The iron or "trade" tomahawk—trade mark of Genesee products—was the first real contribution to better tooling in this country, being used as a general purpose tool by the peaceful Senecas of Je-ni-shi-yeh.

Last month alone . . . Genesee delivered more "Tomahawk" Quality cutting tools to Industry for the war effort than it produced in the entire year of 1939.

YET, GENESEE TOOL COMPANY is not a "war baby". It was incorporated in 1934 to supply the needs of automotive companies in Detroit, in Lansing, in Flint, in Pontiac. . . Growth through the first years was purposely gradual. In those first years Genesee acquired and developed an organization second to none in the designing and production of cutting tools.

In recent years Genesee's growth has been accelerated. Its original plant was expanded,

re-equipped with the most modern of tool production equipment available . . . a second plant was acquired and equipped . . . a corps of trained field representatives was appointed, covering virtually every major industrial center.

Today it ranks as one of the most modern tool companies in the country, producing practically every type of tool used in industry . . . H.S.S. and carbide . . . standard and special . . . for turning and forming, reaming and counterboring and milling, etc.

We will be glad to send you a streamlined condensed catalog of Genesee tools. Ask for catalog No. GT-42 H

GENESEE TOOL COMPANY
FENTON, MICHIGAN



Registered
Trade Mark

icapped, or a woman who can do the job that the 23-year-old boy is doing who took a 12-weeks' course at a learn-quick school.

There are not more than sixty million people in this country who are capable of effective productive effort. These men and women represent our total manpower available to win the war. They must do everything that has to be done in a total war; maintain transportation, communications and utility systems, maintain public services, grow food for ourselves and our allies, mine the metals and produce the raw materials, fabricate and produce the amount of consumer goods necessary to maintain even a restricted national life and the supplies, weapons and munitions of war. Also, most of all they must provide for the men who land on strange shores in far places,

the men who carry the fight to the enemy on a multitude of far-flung frontiers. The rest of the population, who mine raw materials and produce the weapons with which these men fight must be a self-disciplined team working in unity. The individual personal convenience, comfort or pleasure, or the convenience and ordinary leisurely replacement programs of the employer, will have to be given progressively less consideration as the war gets tougher and the casualty lists grow.

When we hear of the big armies we are going to raise, we must all remember that it takes at least 5 men or women to produce what they eat, use, fight with, and wear. With less than sixty million available in this country, these figures merit deep and serious consideration.



READY TO WIN THEIR SECOND WORLD WAR—Machines such as these helped win World War I and now as scrap are being readied for their second hitch with Uncle Sam, in response to the WPB appeal for scrap. Workers in the photo are dismantling old and obsolete equipment, collected in the recent scrap drive at The Baldwin Locomotive Works, Philadelphia. From the scrap pile, the iron and steel will be rushed into production of tanks, guns and other material of war. Baldwin officials estimate the scrap effort will result in salvaging 1800 tons of metal, sufficient to produce 60 of the M-3 tanks which the company is now hurrying off its assembly lines. Machine parts not entirely obsolete are being reclaimed and rebuilt.

Announcing the New

COOLANT PUMP

PATENT APPLIED FOR

Designed by
Francis E.
Brady, Jr.,
Hydraulic
Engineer.
Consultant
to many
machine
tool manu-
facturers.

The most adaptable pump of all . . . MODEL 7500 by BRADY-PENROD, INC. This pump may be made an integral part of any grinder, lathe, cutting or drilling machine or can be easily moved from job to job as needed. A plate adapter is available to fit any tank or base opening. This model is a motor-driven open-impeller centrifugal type, submergeable, with an outside discharge. Internal piping is eliminated; external piping reduced to a minimum. This simplification saves engineering and assembly labor.

THREE DEPTHS SUITABLE FOR ALL MACHINES

MODEL 7500 is available with 3 different depths from flange - $4\frac{3}{4}$ ", 9", and 15".

Motor capacity - $\frac{1}{4}$ H.P. to $1\frac{1}{4}$ H.P.

Controlled flow - from 4 g.p.m. to 100 g.p.m. with any standard coolant fluid. Suitable for use with abrasives. Special depths available.

Long used as standard equipment by machine tool manufacturers, BRADY-PENROD Pumps (6 other models) are proving their reliability and high hydraulic efficiency in hundreds of locations today. Write or wire for details.

Brady-Penrod

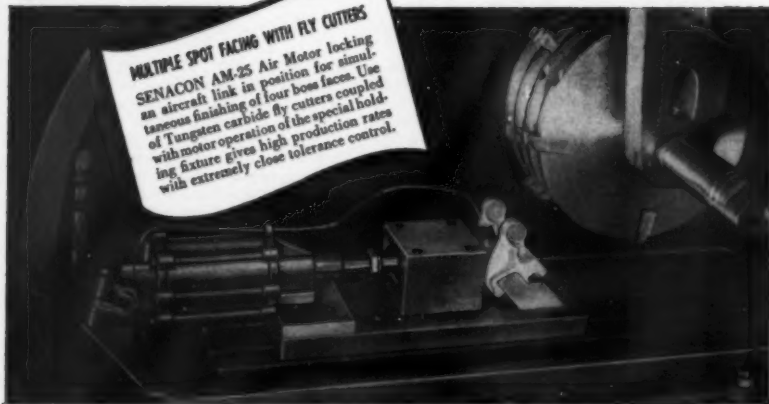
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MUNCIE, INDIANA, U. S. A.

TOUGH FIXTURE PROBLEMS MADE EASY

Senacon AIR MOTORS

MULTIPLE SPOT FACING WITH FLY CUTTERS
SENACON AM-25 Air Motor locking an aircraft link in position for simultaneous finishing of four boss faces. Use of Tungsten carbide fly cutters coupled with motor operation of the special holding fixture gives high production rates with extremely close tolerance control.



Tool Engineers Everywhere Are Finding These Versatile Power Units Indispensable in the Design of Specialized High Duty Fixtures

COMPACTNESS, flexibility and ease of control are inherent characteristics of the exclusive INTEGRAL valve construction of SENACON Air Motors.

These features are particularly valuable in the design of power fixtures which move with the main machine tool, such as holding fixtures for milling machine operations. In such installations the single air line connections, finger tip valve accessibility, and all around compactness of the SENACON Air Motor are particularly appreciated by the tool engineer.

Hundreds of SENACON motors are in daily use giving outstanding service on specialized installations of this character.

SENACON POWERED fixtures are high production fixtures. Every tool designer should be familiar with the possibilities offered by this extremely versatile tool. Write for our new catalog showing typical examples of SENACON Air Motors solving intricate tooling problems.

SMITH - JOHNSON
CORPORATION
623 EAST TWELFTH STREET
LOS ANGELES, CALIFORNIA



SPEED PRODUCTION WITH AIR POWER

Conservation

By ERNEST W. FAIR

TODAY it is not only good business but a patriotic national duty to save supplies and materials and economize in their use. Many materials, supplies, etc., in use in the shop are vital to our war effort, and must be conserved.

As if these facts were not sufficiently important, we have another additional point in that this is wise business management; with every executive's production costs mounting almost daily, there is no longer any excuse for waste or carelessness.

Here are a number of conservation methods being employed by several successful executives in their present shop operations; each and every one of which merits serious consideration by every reader of these pages. All will save against that possible shortage tomorrow . . . all will help keep production costs down . . . all will contribute to the success of the war effort.

Watch Measurements—This means a closer check on measuring for accuracy (in use of oils and greases for example) and to make sure only the right amount is used on each occasion. Steps to prevent wastage during such operations are also advisable.

Check Storage Facilities—Often supplies are lost thru improper storage. Accidents which may cause containers to upset and their contents to be spilled are most frequent. Spoilage, leakage, or deterioration may also occur thru improper storage. It is also advisable

to check the storage spaces or rooms every month or so to make sure they are clean and weatherproof and to check electrical wiring therein in order to safeguard against possible fires.

Avoid Materials Waste—Using a piece of metal an inch too long and resultant loss of an inch of that material after machining is as wasteful as pouring oil down the drain pipe. Such ordinary careless actions on the part of workers that cause such wastage can be stopped by more attention and emphasis on the saving angle. Employees should have this constantly impressed upon them, day and night.

Mistakes Mean Supply Waste—Mistakes should be condemned, and in some instances penalties inflicted, for some of the most costly wastage of supplies in the average machine shop can be charged to errors of judgment. It is serious business to waste supplies, no matter what the form of wasting.

Conserve Electricity — Electricity is becoming one of the most vitally essential of our war supplies; its waste by any one is inexcusable and unnecessarily expensive. Machines should not be left running when their task has been completed. Signs should burn only when needed and electric lights should be turned off immediately when they are no longer required.

Shorter Lengths and Narrower Widths is a good slogan to impress

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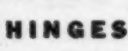
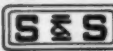
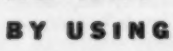
upon every workman in the shop; it is one more opportunity for savings. Here is a point where most of us have a tendency to be wasteful; one at which nearly every machine shop in the land can find opportunities for a considerable measure of conservation by more rigid control.

"Don't Use More Than Necessary" is a good sign to post all over the shop. Make sure every employee thoroughly understands how a "little bit more" than is actually needed of any vital supply item means just that much waste. And those "little bits" don't take long to add up to a formidable lot.

All of these points are of importance. Many others will occur to every executive, from time to time, for wise executives will, in future weeks, be constantly seeking out methods by which they can save supplies and materials and make them last longer and go farther.

However, it is highly important not to overlook the part the employees may play in any conservation campaigns. The efforts of the executive himself will be pitifully small if he cannot obtain the proper spirit of watchfulness and cooperation on the part of each and every employee in the shop. Every employee of every machine shop in the country must be made to realize . . . The supplies we save now may prevent critical shortages later that can hamper our all-out war effort.

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**HYDRAULIC
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SUPPLIED IN THREE DIAMOND GRIT SIZES

No. 1 COARSE	100 GRIT DIAMOND
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WHAT THEY DO: To resharpen carbide tools. Stoning small radii on carbide tools. Dressing short angles or small radii on diamond wheels or abrasive wheels.

These hones are very fast cutting and have an extremely long shop life. They are very difficult to harm in ordinary use. Use kerosene or light oil as a lubricant. To resharpen, bring diamond face lightly in contact with a silicon carbide wheel for about 30 seconds to one minute. The silicon carbide wheel will grind out a small amount of the Tungsten Carbide binder and re-expose the diamond particles.



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555 Prospect St.,

East Orange, N. J.

LARGER ELECTRODES

Speed War Production

USE of larger electrodes in arc welding is giving new impetus to war production in many factories and shipyards throughout the U. S.

In many instances, welding operations vital to this country's war effort, have been speeded up as much as 50% by the use of electrodes 1 or 2 sizes larger. In one instance, the increased speed amounted to 200%, with the aid of improved jigs and fixtures.

This was disclosed by A. F. Davis, Vice President in the results of a nationwide survey conducted by The Lincoln Electric Co., Cleveland. The survey was made to determine the response of users of arc welding to the company's appeal that welders use larger electrodes in the interest of the war effort as well as efficiency.

Responding to the survey, Robert Proctor, chief engineer of the Commercial Shearing & Stamping Co., Youngstown, Ohio, said that some of the company's arc welding methods, including the use of larger electrodes, helped it recently to win the Army and Navy "E" award for production. Use of larger electrodes increased welding speed from 40 to 55%.

"Quite naturally we were highly pleased over this award and since we feel that some of our arc welding methods materially aided us in winning this recognition, we would like to pass these on to others hoping that they may help the war effort," Proctor said.

"The use of the largest electrodes possible for each type of fabricated job is imperative if maximum production is to be obtained. For example, a $\frac{3}{8}$ " fillet weld on $\frac{1}{2}$ " mild steel plate formerly welded with $\frac{1}{4}$ " electrode, at 40 feet per hour of arc time, is now done with $\frac{3}{8}$ " electrode at 95 feet per hour of arc time. This increased our arc time efficiency from 40% with $\frac{1}{4}$ " rod to 55% with $\frac{3}{8}$ " electrode.

"A $\frac{1}{4}$ " fillet on a 3/16" plate, formerly welded with a 3/16" electrode at 8" per minute arc time, can be accomplished with $\frac{1}{4}$ " rod at 14" per minute arc time.

"By proper handling of the electrode, these larger sizes give excellent results even though the first attempts often appear discouraging."

Also to cut welding time in the nation's factories, The Lincoln Electric Co. has introduced the "Fleet-Fillet" technique, which in many instances has increased welding speeds as much as 100%.

Experimenting with larger electrodes, some concerns found that they can be used on thinner metal than they had previously suspected. The 3/16 and $\frac{1}{4}$ " electrodes were used on metals as light as $\frac{1}{8}$ " in thickness.

Use of larger electrodes also has a tendency to cut down the number of passes necessary to make a weld. In many instances, learners on welding jobs are able to do satisfactory work

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Stroke - 1"
Speed - 285 R.P.M.
Die Space - 4 1/4"

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Stroke - 1/2"
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in shorter apprenticeship time, manufacturers discovered.

The highest increase in welding speed—200%—was reported by a manufacturer of belt reels. This increase occurred in shifting from 1/8 to 5/32" electrodes and improving the set-up of the welding job.

Savings in cost ranged upward to 60%, were reported by a pipe manufacturer. A company making tractor idler rollers reported a 50% saving. An analysis of savings achieved was made by Machinery Mfg. Co., Minneapolis. Welding of stator frames in a horizontal position with 3/16" "Fleetweld 7" electrodes, required 3 passes. When a change was made to "Fleetwood 9" 1/4" size, the same weld could be made in 1 pass with a 30% saving in cost. A total saving of 43% was achieved when, in addition to using larger electrodes, the company welded the stator frames in a welding positioner, which permitted downhand welds.

The Food Mfg. Co., Lakeland, Fla., making an amphibian tractor, analyzed the savings made on welds on the stern and catwalk. The stern has 132 feet of welding, which was formerly done with 5/32" electrodes. The time required was 6 hours. Shifting to a 3/16" electrode, the time was cut to 4 hours. Thirty minute per 140-foot unit of structure was saved when a shift was made in welding catwalks.

Other companies reporting increases in welding speeds thru use of larger electrodes are:—Teleweld, Inc., Chicago, structural and penstock welding, 100%; Stevens Metal Products Co., Niles, Ohio, 150%; Aetna Iron & Steel Co., Jacksonville, Fla., 73%; Downington Iron Works, Downingtown, Pa., 22%; Allith-Prouty, Inc., Danville, Ill., 66%; Butler Mfg. Co., Kansas City, Mo., 20%; Clyde Iron Works, Inc., Duluth, 15%; Calvert Iron Works, Inc., Atlanta, Ga., 15 to 20%; and St. Paul Structural Steel Co., 66%.

★ ★ ★ ★

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★ **MIDGET CLAMP.** Improved Model. Toggle bar strengthened, with bolt retainer now integral with bar. Spindles uniformly centered. Exceptionally practical in holding small parts where heavy clamping pressure is required. Spindle has rubber cap.



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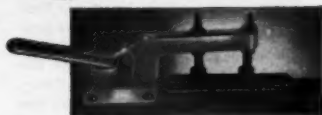


Perhaps YOUR plant can make advantageous use of one of these or other Knu-Vise features. Ask for a demonstration in your plant.

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FIXTURES
To Speed Up
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"Let's Talk Shop!"

Automatic Lathes Important to the War Effort

By JOHN E. HYLER

THE versatility and production speed of automatic lathes are telling heavily in the all-out effort for war production. Years of production experience on the part of those engaged in building and in tooling automatic lathes gives the immediate answer as to just what is best in the way of cutting tools, directions of tool travel, and formers for these machines, and engineers connected with the plants engaged in building automatics are developing methods that are setting standards of speed and accuracy never attained before. Just lately, I noticed a couple of automatic lathe setups, one of which was for machining automatic rifle barrels, and the other for aircraft cannon.

The progress made in the automatic lathe field is very interesting. A few years ago, when I was employed in the Engineering Department of R. G. LeTourneau, Inc., a splendid automatic lathe was designed and built by them for use in their own shops. This type of lathe, I understand, is doing yeoman service in spurring war production, in which the LeTourneau plants are heavily engaged. At the time the lathe in

question was developed, there was some thought of putting it on the market, but I do not know whether there has been time available for production, for they have been very busy on many other types of equipment.

Automatic lathes of the type which automatically return the carriage and the cutting tools to the starting point on conclusion of the cut have been very helpful, enabling an operator to handle 2 or more machines without excessive effort. Some of these machines have been much simplified in the matter of setup time. Cutting down on the time needed for setting up, naturally brings smaller-lot jobs within the practical range of the machines. Step-facing, step-boring, contour facing and turning, and multiple-diameter work, all represent jobs that may be handled to a very high degree of production advantage on the automatic.

Do you have jobs you have been longing to feed to an automatic lathe, but which you have felt are too small to pay out on this basis? Small gear blanks, bushings, and any number of other small turnings fall directly within



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- AS HIGH AS 3000 SLOTTED NUTS PER HOUR ... ALL SIZES FROM $\frac{1}{8}$ to $\frac{1 1}{2}$ HEXAGON ACROSS FLATS

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the production scope of a small automatic lathe I have noticed, that is capable of very high speeds, all the way up to 5,000 rpm. This little automatic is capable of being set for very fine feeds when that is desirable, such as are suitable for diamond turning. Feeds as fine as .001" per revolution are obtained, and great versatility in such a machine is possible, for it can be fitted with as many as 3 former slides when desired, so that complicated work may be handled at a single pass.

Some of the jobs handled at high speed on automatic lathes are more than a study in tooling. They require a close study of cutting, and of proper cutting coolants. This is especially true in cases where a great deal of cutting is being done on a limited amount of surface, leading to the generation of much heat when done at speed. Consider the cooling fins on aviation engine cylinders. In one case that came to my attention, 3 gangs of 28 tools each were being used in an automatic, yet in spite of the fact that 28 tools were cutting at once, the cutting action was such, due to the application of the right coolant in the right way, that there was no jamming and no tearing of the fins.

Hydraulic feed is used on some of our modern automatic lathes to a high degree of advantage. On one machine engaged in machining shell bodies, both formers are traversed by tools that are advanced hydraulically, and the hydraulic setup is such as to incorporate a pilot valve working in conjunction with the trip dog. Rotation of the pilot valve by the dog throws the feeds into rapid traverse for returning the carriage and the rear slide quickly to their starting positions. The tailstock spindle traverse on this machine, and also the expanding mandrel on which the shell bodies are held for turning, are both operated by means of foot-treadle valves at the floor line.

Some automatic lathes have naturally been designed from the standpoint of versatility, for there is a shop here and there where a high versatility rating for a machine is of greater importance than production speed, strictly as such.

ALONE IN ITS FIELD!

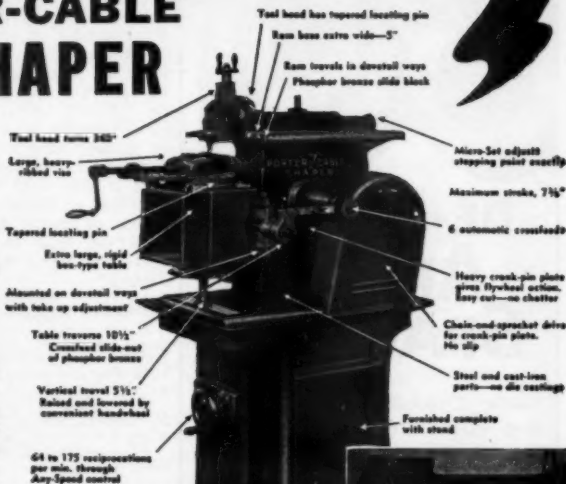
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Use De-Sta-Co Spacers for quick set-up of milling machine cutters and wherever low cost, accurate spacing is required. Stock sizes .001" to .125" thick.

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Established Over 25 Years
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There are automatic lathe builders who are prepared to furnish a very wide selection of independent and automatic feeds for various slide tools. In consequence, their machines may be tooled to handle practically any cylindrical part to be found.

Look around in any progressive machine shop today, and you will find some model of an automatic lathe doing its bit in an outstanding way, and in some very important way. Their contribution to the war effort would be difficult indeed to estimate. When you consider that a machine engaged in turning airplane valve tappet guides is producing at the rate of 38 per hour, that it was held to this schedule over a period of 11,000 hours with only 12.7 hours of down time, you will agree with me that the automatic lathe is certainly doing its part to "Keep 'Em Flying."

EDITORIAL NOTES—

The 2 automatic lathes mentioned, one of them set up for machining automatic rifle barrels and the other for aircraft cannon, were Fay automatics, made by Jones & Lamson Machine Co., Springfield, Vermont.

The automatic lathes developed by R. G. LeTourneau and built in his own Peoria shop when I was there, were named Tournamatics.

Automatic lathes in which setup time has been reduced, suitable for set-facing, step-boring, contour facing and turning, or multiple-diameter work, are made by the Monarch Machine Tool Co., Sidney, Ohio.

The little automatic lathe that can be speeded to 5,000 rpm, with a feed as fine as .001" per revolution, and which may be fitted with as many as 3 former slides, is the "Imp," made by Seneca Falls Machine Co., Seneca Falls, N. Y.

The particular job mentioned which involved 28 tools cutting at once on cooling fins, was done on a Jones & Lamson Fay automatic lathe, using a coolant supplied by The Texas Co., 135 East 42nd St., New York City.

The machine using a hydraulic feed for carriage and rear slide, and with the other adaptations mentioned, is one made by Sparks Machine Tool Corp., Norwalk, Conn.

Automatic lathes having an exceptionally high versatility rating, and providing a wide selection of independent and automatic feeds for various slide tools, are made by Gisholt Machine Co., 1219 Washington Ave., Madison, Wis.

The machine setting the record mentioned on airplane valve tappet guides, is one built by Cone Automatic Machine Co., Inc., Windsor, Vermont.

The Lipe Carbo-Matic Lathe, made for high speed hydraulic automatic operation with the

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BETTER THAN *One*



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**MONEY
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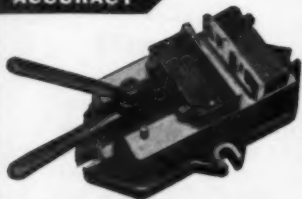
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latest carbide tooling is made by Lipe-Roloway Corp., Syracuse, N. Y.

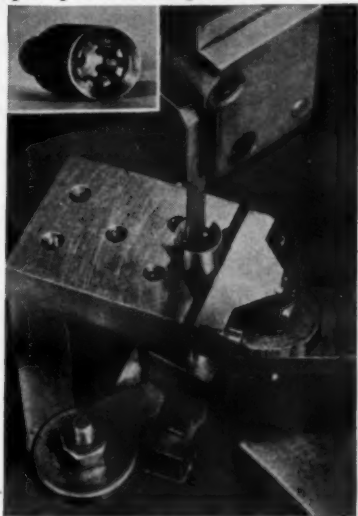
Special lathes for high speed gun and shell production are made by R. K. LeBlond Machine Tool Co., Cincinnati, O.

Full hydraulic automatic multiple tooled lathes for shell turning and other high production jobs are made by The Norwood Engineering Co., 94 No. Maple St., Florence, Mass.

Automatic shell turning lathes have also been developed by Morey Machinery Co., Inc., 410 Broome St., New York City.

Multiple Splines

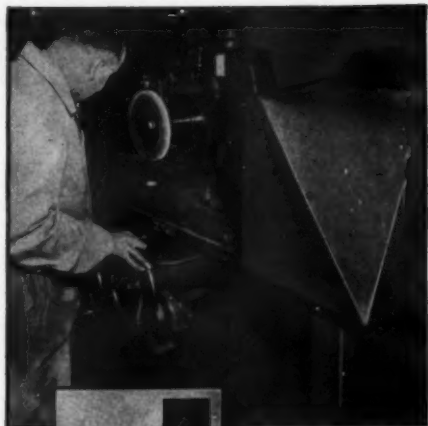
A slotting head attachment (Slot-master—made by Experimental Tool & Die Co., 12607 Greiner St., Detroit, Mich.) that may be adapted to round or flat-on-round overarm milling machines may be used for cutting multiple splines in adapters.



The adapters are clamped on a "V" block which in turn is mounted on the rotating table on a milling machine. A slotting tool, ground to the exact dimension required is fastened to the clapper box tool holder and the job is ready for slotting. It takes a few minutes to cut each spline, whereupon the adaptor is rotated to a new position. And the operation is repeated until all of the splines are cut accu-

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CAUSED BY DUST
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J-B TAP GRINDERS — FILTAIRE PORTABLE DUST COLLECTORS — AMERICAN TOOL HOLDERS — BLACK DIAMOND PRECISION DRILL GRINDERS

rately dimensioned and equally spaced. If the Slotter were not employed, the splines would have to be broached. This would involve the expense of a series of broaches and several operations be-

cause the splines stop at the shoulder of the adapters . . . Use of the Slotting head saves tooling expense and the entire operation is accomplished with one set-up.

Increasing Universal Mill Versatility

An unusual means of increasing the versatility of a Universal Mill is reported by Johnson & Thomas Machine Works, Los Angeles, which may prove of value to other firms engaged in grinding operations. The firm purchased a Fray Number 7-B Ram Type Universal Mill, which is normally equipped with a Type D Milling Attachment. This basic machine is used for all types of milling and grinding operations in connection with their own tooling programs, and in addition is equipped with a Type A Fray Milling Attachment for special grinding operations on a contract they hold for making broaches. These broaches are used by a prominent tool manufacturer who is filing a large Air Corps contract for tools, each of which must be broached.

The second milling attachment is mounted on a pad attached to the column, and lies in a horizontal position with respect to its shaft line. It



remains in this position during the grinding operations on the broaches and cross travel of the table is controlled by a hand lever instead of the hand wheel normally used, in order to accelerate cross movement of the broaches during the grinding.

When broach grinding operations are completed and other work is scheduled for the machine, the Type A Fray Milling Attachment is swung

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All Lathe Operators!

LOMBARD POWER-FEED TOOL HOLDER Eliminates All Chatter

Cutting-off in a lathe has always been a most difficult job, because the stock jumps, lifts, and climbs on the tool. All this is now made impossible with the Lombard Tool Holder, because it is equipped with a steady-rest that rides over the work. Holds work down. Stock can't lift. Operates smoothly, without vibration. Makes cutting-off a pleasure.

Makes Cut-off Blades Last Much Longer

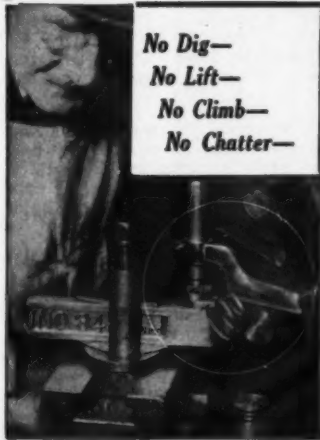
—because the steady-rest supports and protects the blades against sudden lifts of the stock.

Different from Any Other Cut-off Tool Holder

Due to the steady-rest support, it operates perfectly and safely on power or machine cross-feed. Instead of breaking the chip, it peels off a continuous ribbon.

Operates Smooth and Steady

Stock can't lift. Different—has a shearing action. Makes any lathe cut off even smoother than most screw machines—even though the lathe bearings are pretty well shot. Makes tool cut like cheese.



**No Dig—
No Lift—
No Climb—
No Chatter—**

GUARANTEED

to be the smoothest cut-off tool ever used, or money will be refunded.

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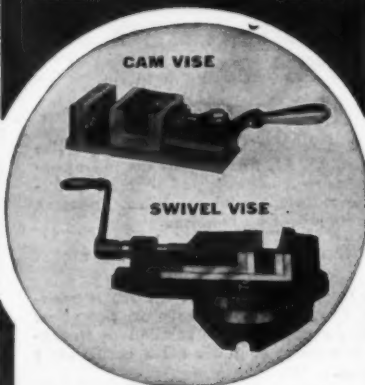
For 12" to 14" Lathe.....\$14.75
For 16" to 18" Lathe.....\$15.75
Add \$2.00 for Extra Heavy Duty Model

Order Direct! Money-back Guarantee!

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It's the New Way to Cut-off!

Precision Built "MODERN" VISES



"MODERN" VISES are precision-built with hardened and ground jaws for rapid production work on milling machines, shapers and drill presses.

CAM VISES—Jaw dimensions: width 4" or 5", depth 1½", maximum opening 2" or 3".

SWIVEL VISES—Jaw dimensions: width 4", depth 1½", maximum opening 3". Can be used without base.

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MANUFACTURERS OF PRECISION HIGH-SPEED STEEL
AND CARBIDE CUTTING TOOLS.

MODERN TOOLS
EAST BERLIN CONN.

out of position and the entire ram assembly is swung on the turret head back into normal position. Thru this arrangement, the already wide flexibility of the Fray Universal Milling Machine is greatly expanded, with a considerable saving in other tools that might otherwise be required.

Weights of Cast Rounds

H. F. Williams

From the designing board to the finished product, in many instances, the weights of the various components of a machine or mechanism must be known. From handbooks, the weight per inch or foot can be found for round steel or brass bar stock, but when it comes to other metals such as cast iron, brass or aluminum and sometimes lead, especially when castings are involved, such figures are not available.

The accompanying tables have been a great time saver for both the estimating department and foundry office when calculating casting weights from blueprinted detail drawings. These tables are arranged so that the weights of rounds made of cast iron, wrought iron and steel, common yellow brass, bronze, aluminum and lead can be read directly for lengths of 1" long. Diameters from 1 to 100", advancing by ¼" increments are listed. Areas and circumferences of these circles are also given.

If, for example, the weight of a disk of cast iron is to be calculated whose size is 16½" diameter and 2¼" thick, the figure 55.5 lbs opposite 16½ in the cast iron column is simply multiplied by 2¼ giving 124⅞ lbs.

If the weight of a cast iron pulley is required, having a webbed center instead of spokes and a cored hub, it is broken down into circular components after the desired finish has been added to the various surfaces. The weight of a disk equivalent to the inside diameter of the flange is subtracted from the weight of the outside diameter of the pulley and multiplied by the face of the pulley. The hub with the cored hole is figured likewise. The web is a cored disk comprising the metal between the hub and the

The
ROBERTSON
Compound Angle
WHEEL DRESSER



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saves precious man-hours in production

This precision instrument is playing a vital, important part in America's all-out war effort . . . speeding-up production, by saving both time and money.

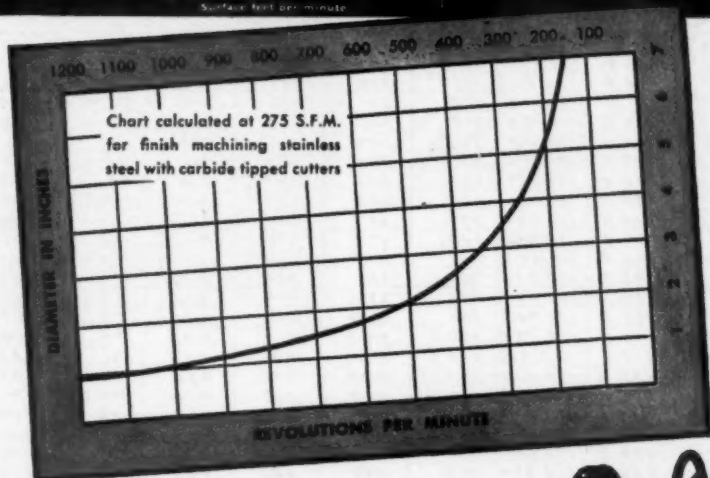
With the Robertson Compound-angle Wheel Dresser, a machine operator can dress an included angle tangent-to-radius from 0° up to and including 180° at one setting, thus eliminating the old method of "trial and error" dressing.

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420 BROADWAY - MALDEN, MASS.

DIAMETER	AREA SQ. IN.	CIRCUMFERENCE	WEIGHT IN POUNDS PER ONE INCH OF LENGTH					
			CAST IRON	WROUGHT IRON & STEEL	COMMON YELLOW BRASS 60% COPPER	BRONZE	ALUMINUM	LEAD
26	530.93	81.6814	138	149.2	160	170	49.2	218
26 1/8	541.19	82.4668	140.8	152.2	163.5	173	50.2	223.5
26 1/4	551.55	83.2522	143.2	154.5	166	176	50.4	226
26 3/8	562.00	84.0376	146	157.8	169.5	179.5	52	231
27	572.56	84.8230	149	161.	173	183.2	53	235.5
27 1/8	583.21	85.6084	151.5	164.	176	186.5	54	238
27 1/4	593.96	86.3938	154.2	166.5	178.7	189.5	54.8	243.5
27 3/8	604.81	87.1792	157.2	170	182	193	56	248
28	615.75	87.9646	160	173	185.7	197	57	253
28 1/8	626.80	88.7500	163	176	189	200.5	57.5	257.5
28 1/4	637.94	89.5354	166	179.5	192.5	204	59.2	262.5
28 3/8	649.18	90.3208	168.5	182	195.5	207.5	60	266
29	660.52	91.1062	172	186	199.5	211.5	61.3	272
29 1/8	671.96	91.8916	174.5	188.5	202.5	215	62.2	276
29 1/4	683.49	92.6770	177.8	192	206.5	219	63.3	281
29 3/8	695.13	93.4624	180.5	195	209.5	222	64.3	285
30	706.86	94.2478	183.8	199	213.5	226	65.4	287.5
30 1/8	718.69	95.0332	187	202	217	230	66.6	295.5
30 1/4	730.62	95.8186	190	205.5	221	234	67.7	300
30 3/8	742.64	96.6040	193	208.5	224	237.5	68.7	305
31	754.77	97.3894	196	212	227.5	241	69.7	310
31 1/8	766.99	98.1748	199	215	231	245	70.8	315
31 1/4	779.31	98.9602	202.3	218.5	235	249	71.8	320
31 3/8	791.73	99.7456	206	223	239	253.5	72.4	325.5
32	804.25	100.5310	209	226	243	257	74.4	330
32 1/8	816.86	101.3164	212	229	246	261	75.5	335
32 1/4	829.58	102.102	216	231.7	251	266	77	341.5
32 3/8	842.39	102.887	219	237	254	269.5	78	346
33	855.30	103.673	222	240	257.5	273	79	351
33 1/8	868.31	104.458	226	244.5	262.5	278	80.5	357
33 1/4	881.41	105.243	229	247.5	265.5	282	81.5	362
33 3/8	894.62	106.029	232.5	250.7	270	286	82.8	368
34	907.92	106.814	236	255	274	290.5	84	373
34 1/8	921.32	107.600	239.5	259	278	295	85.3	379
34 1/4	934.82	108.385	243	263	282	299	86.5	384
34 3/8	948.42	109.170	246.5	266.5	287	304	87.8	390
35	962.11	109.956	250	270.5	290	307.5	89	395.5
35 1/8	976.91	110.741	254	274.5	295	313	90.5	402
35 1/4	989.80	111.527	257.5	278	299	317	91.7	407
35 3/8	1003.8	112.312	261	282	303	321	93	413
36	1017.9	113.097	264.5	286	307	325.5	94.2	418
36 1/8	1032.1	113.883	268.2	290	311	330	95.5	424
36 1/4	1046.3	114.668	272	294	315.5	335	96.8	430
36 3/8	1060.7	115.454	275.8	297.5	320	339	98	436
37	1075.2	116.239	279.5	302	324	344	99.5	443
37 1/8	1089.8	117.024	283.5	306	329	349	100.7	448
37 1/4	1104.5	117.810	287.5	310.5	333.5	354	102.5	454
37 3/8	1119.2	118.596	291.5	315	338	359	103.7	461
38	1134.1	119.381	295	319	342	363	105	467
38 1/8	1149.1	120.166	299	322	347	368	106.5	473

Cutting Quiz: How many S.F.M. for Stainless Steel?

Surface feet per minute



Surface speeds for machining stainless steel with carbide tools can be from $2\frac{1}{2}$ to 3 times faster than with high speed steel. This means **MORE R.P.M.** from old equipment for high output.

Given Vari-Speed Drives provide 30% more r.p.m. in the top bracket without sacrifice in the low! Installation of Given Vari-Speed Drives on otherwise obsolete machine tools brings these important benefits: (1) More speeds in the high range; (2) more efficient production with carbide tools; (3) instant and infinitely variable speed control without stopping the machine; (4) independent individual motor drive.

The Given Vari-Speed Drive gets **MORE PRODUCTION** from the same tools! No belt changing. No gears. No vibration. No danger. A bracket for every machine. 1 to 10 h.p. Low cost. Prompt shipment.

Ask for bulletin and installation blueprints.



MODERNIZE THE GIVEN WAY

Given VARI-SPEED DRIVE

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DIAMETER	AREA Sq. In.	CIRCUMFERENCE	WEIGHT IN POUNDS PER ONE INCH OF LENGTH					
			CAST IRON	WROUGHT IRON & STEEL	COMMON YELLOW BRASS 60% COPPER	BRONZE	ALUMINUM	LEAD
38 1/2	1164.2	120.951	303	328	352	373	108	478
38 3/4	1179.3	121.737	307	332	357	378	109.5	485
39	1194.6	122.522	311	336	361	382	111	492
39 1/4	1210.0	123.308	315	341	366	388	112.5	497
39 1/2	1225.4	124.093	319	345	370	393	113.5	504
39 3/4	1241.0	124.878	323	349	375	398	115	511
40	1256.6	125.664	327	354	380	403	116.5	517
40 1/4	1272.4	126.449	331	358	384	408	118	523
40 1/2	1288.2	127.235	335	362	389	412	119.5	529
40 3/4	1304.2	128.020	339	367	394	417	121	536
41	1320.3	128.805	343	371	398	422	122	542
41 1/4	1336.4	129.591	347	375	403	427	123.5	548
41 1/2	1352.7	130.376	351.5	380	408	433	125	555
41 3/4	1369.0	131.161	356	385	414	438	127	562
42	1385.4	131.947	360	389	418	443	128	569
42 1/4	1402.0	132.732	364.5	394	424	448	130	576
42 1/2	1418.6	133.518	368.5	398	428	453	131	582
42 3/4	1435.4	134.303	372.5	403	433	458	132.5	588
43	1452.2	135.088	377.5	408	437	464	134.5	597
43 1/4	1469.1	135.874	382	413	443	470	136	604
43 1/2	1486.2	136.659	386	418	448	475	137.5	610
43 3/4	1503.3	137.445	391	423	454	482	139.5	618
44	1520.5	138.230	396	428	460	487	141	627
44 1/4	1537.9	139.015	400	433	464	492	142.5	632
44 1/2	1555.3	139.801	405	438	470	498	144.5	640
44 3/4	1572.8	140.586	410	444	476	505	146	648
45	1590.4	141.372	414	448	481	510	147.5	655
45 1/4	1608.2	142.157	418	453	485	516	149	661
45 1/2	1626.0	142.942	423	458	491	521	150.5	668
45 3/4	1643.9	143.728	428	463	497	527	152.5	677
46	1661.9	144.513	433	468	503	533	154	684
46 1/4	1680.0	145.299	437.5	473	508	538	155.5	691
46 1/2	1698.2	146.084	442	477	513	544	157.5	698
46 3/4	1716.5	146.869	446	482	517	548	159.5	705
47	1734.9	147.655	451	488	523	555	160.5	712
47 1/4	1753.5	148.440	456	493	529	561	162	720
47 1/2	1772.1	149.226	461	498	535	567	164	728
47 3/4	1790.8	150.011	466	504	541	573	166	736
48	1809.6	150.796	471	509	546	579	167.5	744
48 1/4	1828.5	151.582	476	514	552	585	169.5	752
48 1/2	1847.5	152.367	481	520	558	592	171	760
48 3/4	1866.5	153.153	486	525	564	597	173	768
49	1885.7	153.938	491	531	570	604	174.5	775
49 1/4	1905.0	154.723	496	536	575	610	176.5	783
49 1/2	1924.4	155.509	501	541	582	616	178	791
49 3/4	1943.9	156.294	506	546	588	622	180	800
50	1963.5	157.080	511	552	593	628	182	807
50 1/4	1983.2	157.865	516	558	599	634	183.5	815
50 1/2	2003.0	158.650	521	563	605	641	185.5	823
50 3/4	2022.8	159.436	526	568	610	647	187	830

LESS SET-UP TIME

MEANS MORE

Production

FROM
EVERY GRINDER



With the Robbins Magna-Sine your set-up time on either single or compound angular grinding jobs can be reduced from hours to minutes. When this saving in time is multiplied by the number of jobs on each grinder, the result means a considerable increase in the productive capacity of your grinding department.

Equally as important as the time saving feature of the Magna-Sine is its absolute accuracy. The Magna-Sine uses the gage block method of determining angles, and the precision construction of the Magna-Sine makes the angle just as accurate as the standard gage block that is used.

A Magna-Sine should be available for every grinder on which an average volume of angular grinding work is done. It is available in two sizes in both compound and single angle models.

Write for complete information today.

The MAGNA-SINE



The Magna-Sine is also available in a non-magnetic model for the accurate inspection of angular machining work. The non-magnetic model is built on the same principle and to the same close limits as the magnetic model.

ROBBINS ENGINEERING COMPANY

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LINCO Two Spindle
ADJUSTABLE
DRILL HEADS
Drills Two Holes at Once



✓ *Adjustable Centers
 from 1/2" to 6"*
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Sleeve and overarm types . . . several sizes. Will double production of any single spindle drill press. Quickly adjusted to any desired drill centers from 1/4" to 6".

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inside diameter of the flange. These figures are then totaled.

The tables are equally efficient for work larger than 100" diameter, weights being found by these equations:

For diameters from 101 to 200", weights will be
 Given diameter

$$\frac{2}{\text{Given diameter}} = \text{Weight from table} \times 4$$

For diameters from 201 to 300", weights will be
 Given diameter

$$\frac{3}{\text{Given diameter}} = \text{Weight from table} \times 9$$

For diameters from 301 to 400", weights will be
 Given diameter

$$\frac{4}{\text{Given diameter}} = \text{Weight from table} \times 16$$

For example, the weight of a flat aluminum disk 123" diameter 2" thick is found in this manner:

$$\frac{123}{2} = 61\frac{1}{2} \quad \text{From table, weight for } 61\frac{1}{2} = 275 \text{ lbs.}$$

$$275 \times 4 = 1100 \text{ lbs.}$$

$$1100 \times 2 = 2200 \text{ lbs.}$$

The figures in the table for diameters greater than 16" are correct to one place beyond the decimal point. The weights are based on these weights per cubic inch:

- Cast iron .260 lbs
- Wrought iron and steel .282 lbs
- Yellow brass .302 lbs
- Bronze .320 lbs
- Aluminum .092 lbs
- Lead .411 lbs

(Editorial Note—Two of the tables appeared in the August issue—pages 194-6. Additional tables are given in this, and succeeding issues. Save them for your engineering data file.)

The Use of Gage Blocks

When one comes down to a careful consideration of the fact that gage blocks as furnished by specialists in their manufacture are made accurate, not to thousandths as in ordinary machine shop work, not to ten-thousandths as in the case of ballbearings and other work demanding very close tolerances, but literally accurate to tolerances of a few millionths, he will



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Get more work, quicker, out of lathes, millers, grinders, etc. Machines take deeper cuts at higher speeds, because the IDEAL Live Center rotates with the work. Saves set-up time. It's fitted with high precision radial ball bearings and taper roller thrust bearing.



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3 Interchangeable Center Pieces.



For all centered and uncentered work.



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Gives information on these and many other time-saving tools.

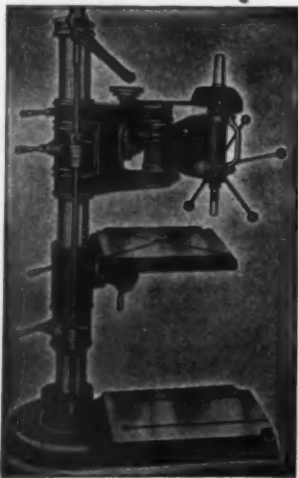
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St. Louis

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be more likely to give them the consideration and care they so richly deserve. It is one thing to obtain a set of high-precision blocks, and it is another thing to keep them in good condition. Yet where proper attention is bestowed, they may be used for many years without losing their accuracy in any degree worthy of mention.

Guard your blocks carefully against any form of use that will result in undue wear. Some get into the habit of slipping a block into and out of a slot 2, 3 or 4 times while coming to a decision as to whether it is sufficiently accurate. This is really unnecessary. The first application tells the story just as fully as 4 or 5 tries. Above everything, be sure that both the block being used and the slot being checked are perfectly clean. Use either a chamois or a piece of soft clean paper, such as toilet tissue, for cleaning the work and the blocks. Some use both, first the chamois and then the paper. Do not use cloth or fabric of any kind, for this will leave lint behind it in some degree, which will impair the accuracy of the test.

As for swiveling gage blocks in slots and notches, or sliding them back and forth in a slot, it should be self-evident that such practices will surely impair the accuracy of the blocks, and should not be tolerated. Remember that the amount by which any individual gage block departs from its accuracy thru wear is not the whole story. Where several blocks are wrung together to obtain some needed combination measurement, the error will add up to the total of that present in all of the blocks being used in the combination.

One outstanding maker of gage blocks and other devices for the maintenance of very close accuracy, in addition to providing an excellent set of blocks, accurate to 8-millionths, also manufactures some excellent inspection laboratory tools which are particularly valuable for making a periodical check-up on the blocks to determine what amount of wear has taken place in the gage blocks over given periods of time. Such instruments include projectors, optical parallels, a so-called "comparitol," and binocular

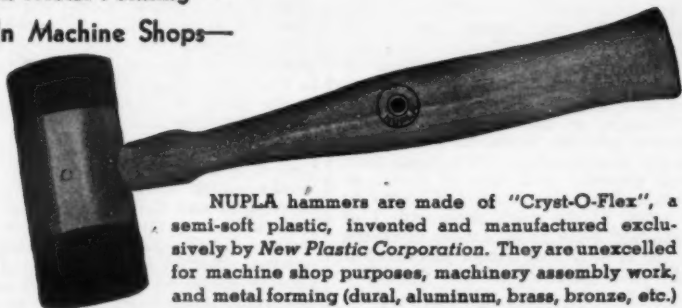
NUPLA PLASTIC HAMMERS

SAVE TIME AND MONEY

In Machinery Assembling—

In Metal Forming—

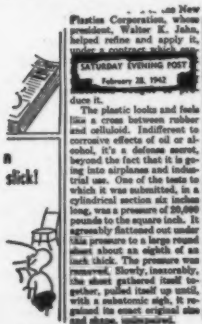
In Machine Shops—



NUPLA hammers are made of "Cryst-O-Flex", a semi-soft plastic, invented and manufactured exclusively by New Plastic Corporation. They are unexcelled for machine shop purposes, machinery assembly work, and metal forming (dural, aluminum, brass, bronze, etc.)

FIVE BIG ADVANTAGES

1. NUPLA HAMMERS neither mar nor cut metal or other materials.
2. NUPLA HAMMERS prevent "pile up" of materials.
3. NUPLA HAMMERS do not sting or vibrate in heavy use, thereby reducing fatigue to a minimum.
4. NUPLA HAMMERS have exceptional durability.
5. NUPLA HAMMERS are not affected by gasoline, oil, etc.



Plastic Corporation, whose president, Walter K. Jahn, helped refine and supply it, under a contract which dates it.

The plastic looks and feels like a cross between rubber and celluloid. Indifferent to corrosive effects of oil or alcohol, it's a definite asset, beyond the fact that it is going into airplanes and industrial use. One of the tests to which it was submitted, in a cylindrical section six inches long, was a pressure of 20,000 pounds to the square inch. It sagged slightly under this pressure to a large round sheet about an eighth of an inch thick. The pressure was removed. Slowly, inexorably, the sheet gathered itself together, pulled itself up until, with a subatomic sigh, it regained its exact original size and shape, unimpaired.

A. St. Lin. He is Win. And he in spite Through it And none What about

The stuff When it And will Counted Express But the As he Have Look Over it

TWO HARDNESS GRADES:

Grade A—General Machine Shop Use.

Grade B—Hardened Cryst-O-Flex for Metal Forming.

SIZES

1-7/8"
1-7/8"
1-7/8"
1-3/8"
1-3/8"
1-3/8"
1
1

WEIGHTS

15 oz.
24 oz.
2 lbs.
8 oz.
17 oz.
5 oz.
8 oz.

NEW PLASTIC Corporation

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microscope providing 3-dimensional vision.

Be sure to keep your gage blocks out of the vicinity of grinding machines or other locations where abrasive dust may settle upon them, or upon the work to be tested. You will appreciate that where such high accuracy is involved, a moderate amount of abrasive dust can soon work havoc. Some make gage blocks that are even more accurate than the ones already mentioned, and they make a difference in tolerances between gage blocks used as working sets and inspection sets. Those used on the job are made accurate to 8-millionths as before noted, but inspection sets are made to a tolerance of only 4-millionths. The same firm which provides both sets of blocks as mentioned, is also known to cater to the needs of the small shop with 1 or 2 standard tests to be made, involving the use of only 2 or 3 gage blocks. For such, individual blocks are furnished on order.

I have even heard of one producer of gage blocks who claims that some of his blocks are available which are accurate within 2 millionths. It is difficult to conceive of such accuracy, and it is also true that there will be few cases where such a high degree of precision is needed, but it is interesting to remember that it may be obtained if and when it is wanted.

It will pay users to remember the proposition of corrosion as it applies to gage blocks. Acid conditions of any type are likely to cause corrosion or rust. It has happened in different shops. In any place where acid is used

directly as such, gage blocks must of course be kept far removed from such operations. Even in the case of rather mild acid fumes, as where acid is used for a flux in soldering operations, care must be used about having gage blocks where they will be exposed. Finally, with reference to acid, many do not realize that human perspiration has an acid content, but it is true. When putting gage blocks away, wipe them perfectly clean with soft paper, and avoid touching them with the bare fingers. Otherwise, you may be surprised to find your finger marks upon them in the form of light rust or corrosion when you take them out again.

It should be remembered, however, that it is now possible to obtain gage blocks which have been plated with chromium, and that such are less subject to the ravages of wear or corrosion. I have wondered, in this connection, whether the chromium plating process would not be very valuable for restoring worn gage blocks to their original dimensions, together with the proper grinding and lapping facilities. It is my understanding that chromium has been used in this way for restoration of worn dies. It would seem to be equally applicable to gage block restoration.

The manufacturer of gage blocks providing a set accurate to 8-millionths, and also the inspection laboratory instrument cited, is George Scherr Co., Inc., 122 Lafayette Ave., New York City.

The firm making working sets of gage blocks accurate to 8-millionths, and inspection sets with a tolerance of only 4-millionths, who also will provide individual blocks if and as needed by industry, is Webber Gage Co., of 12905 Triskett Road, Cleveland, Ohio.

The concern producing gage blocks, in some cases accurate to 2-millionths as mentioned, is the Johanson Division of the Ford Motor Co., Dearborn, Mich.

The company furnishing gage blocks of the chromium plated type as mentioned is the Dearborn Gage Co., 22032 Beech St., Dearborn, Mich.

Vernon 6" UNIVERSAL INDEX CENTERS



Head swivels and locks from 10° below horizontal to 10° past perpendicular. Spindle taper #98&S. The 3 index plates provided will divide all numbers to 50 and all even numbers to 100 (except 96T).

Write for bulletin.



MACHINERY MANUFACTURING COMPANY


HORIZONTAL MILLS, VERTICAL MILLS AND
110 SIZES, DRAPERS AND GRINDERS

"THROW YOUR SCRAP INTO THE FIGHT!"

Every Ton Means 2-Tons
More Steel to Jolt the Axis.

and now ---

THERE IS NO GEAR TOO SMALL TO BE FINISHED BY "SHAVING"



A one inch diameter annular gear being finished on a new Michigan 861-4B.

For the past few months we have been busy telling you about the new "Michigans" on which you can shave gears up to 4 ft. in diameter.

Now we would like to introduce to you the new Michigan 861, designed for the producer of small gears—for instruments, for control mechanisms, etc.—from a maximum of four inch diameter down to as close to zero diameter as you can make a gear.

It will handle gears up to 1 inch face width and down to "nothing". The gears can be mounted on shafts up to 9 inches long or they can be annular types with no shafts at all.

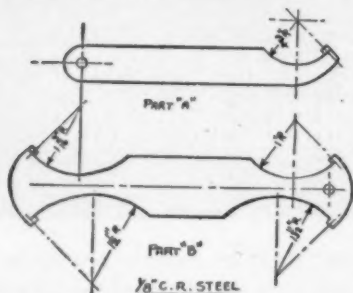
Just rough them out, put them on the Michigan 861-4B crossed axis gear finisher and in a few seconds they will be finished to within tenths of a thousandth.

MICHIGAN TOOL

7171 E. *Company* DETROIT,
McNICHOLS ROAD U.S.A.

The new Michigan 861-4B which will accurately finish machine the minutest gear in far less time than it takes to read this advertisement.

Stamped Spanner Wrenches



In order to save labor and material where 4 different sizes of spanner wrenches were required, rather than to make 4 different sizes of spanner wrenches, such as shown in Part "A," it was decided to embody all 4 wrenches on one piece of material such as Part "B."

After careful consideration, it was decided to construct a die of initial low cost, short setup time, and high quality production to produce a limited number (500 in this case) of such wrenches as Part "B."

While the die in this case was of initial low cost, the semi-mass production ability compared very favorably with that of the conventional type die used in blanking and piercing of such parts. This was not only a great saver in material and labor on tool cost in producing the various wrenches, but was a very decided factor in connection with the finishing, such as heat treating, plating and packing for shipment.

(D. A. Rogers—Dayton Rogers Mfg. Co., Minneapolis).

Planer Wiring

By W. B. Wigton, Electrical Engineer

In the past it has been customary for planer purchasers to wire their machine tools permanently after these tools had been delivered and installed in their plants. Since their electricians were usually unfamiliar with the equipment, particularly with the variable voltage planer drive, considerable

delay was usually encountered in getting the machines into production. In some cases this delay amounted to several weeks after the machine had been erected.

For approximately a year preceding the present conflict, the Cincinnati Planer Co., has been quoting its equipment on a permanently wired basis. Customers have appreciated the obvious advantages to be obtained and almost unanimously have specified on their orders that their machine tools be permanently wired before shipment.

The system of wiring has evolved into a standard arrangement which can be prefabricated by Cincinnati Planer electricians before the machine tool is erected on the assembly floor. All wiring is identified by metal tags, with numbers corresponding to those on the wiring diagram, so that any wiring which must be disconnected before shipment may be readily re-connected by customer's electricians when machine is installed.

As a result of this development it is now possible to place the machine tool in production almost as soon as it has been erected. The Cincinnati Planer Co. has, therefore, not only taken an interest in getting machines shipped from its own plant, but has realized that a machine tool is of no use in the war production effort unless it is actually running and producing.

Milling Machine Practice

This interesting 28-page booklet (No. M-773-1) by Hans Ernst, Research Director and Mario Martellotti, Research Engineer, The Cincinnati Milling Machine Co., is a reprint of the technical data originally appearing in Kent's Mechanical Engineer's Handbook. Additional helpful data is given on the machining of magnesium. Also, information on characteristic types of milling machines and attachments has been added. Many interesting pages are included on milling cutters and their uses. The type is large and easily read and there are numerous pertinent illustrations. Anybody interested in milling machine practice will find much valuable data in this little volume.

HOW
"Detroit"
 STANDARDIZED
 SPECIAL TAPS
for SHELL for
 FASTER DELIVERY



Above: A group of 40 mm. shell, with some of the standardized DETROIT taps and the DETROIT thread gage used for checking the threads.★

A year ago practically every manufacturer of 40 mm. shell had his own specifications for the special taps required for identical operations: threading the ends of the shell body. With a score of companies involved, Detroit Tap engineers saw that if an agreement could be reached on the design of tap for these identical operations by different manufacturers that deliveries of taps could be speeded.

After thoroughly investigating the field requirements, Detroit Tap engineers recommended two standardized designs, one for each end.
 ★Today already well over half of these 40 mm. shell producers are using standardized special "DETROIT" taps—now turned out by "DETROIT" on a PRODUCTION basis with greatly expedited deliveries.

★Similar Standardized Taps for 30 mm. Shell also available

A new Detroit Tap Catalog will be off the press shortly. Shall we reserve a copy for you? Ask for Catalog 22H on your company letterhead.

THREAD GAGES
 RING & PLUG

TAPS
 SPECIAL & STANDARD

CUTTERS
 THREAD MILLING

DETROIT TAP &

TOOL Company 8432 BUTLER
 DETROIT

"Greenfield"

**CUTTER-
REAMER**

AND

**UNIVERSAL
TOOL GRINDER**



**NO. 3 MOTOR
DRIVEN
GRINDER**

**CONSTRUCTION
CAPACITY
CONVENIENCE**

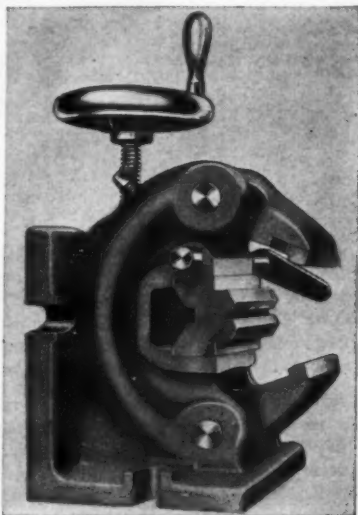
The No. 3 Motor in Head Grinding Machine is ideally suited to the shop. Its heavy construction and rigidity make it a first class production machine on various types of work. It is capable of handling most all tool sharpening or tool room grinding, within its capacity. With it may be sharpened straight, taper or rose reamers; spur bevel, spiral, formed or end milling cutters; taps, countersinks or counterbores. It can be quickly set up for the accurate grinding of straight or taper arbors, keys, gages and to e edges, sides and the ends of flat, square, hex, agon or octagon bars. The holes in cutters, or other small internal work, are easily handled.

WRITE FOR ILLUSTRATED FOLDER

PRODUCTION MACHINE CO.
GREENFIELD, MASS.

Self-Centering Shaft Vise

The Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn., is now manufacturing a Self-Centering Shaft Vise to hold spindles or shafts for such operations as keywaying, slotting or splining. The vise is made for vertical or horizontal mounting on machine table—both bases being accurately machined at right angles. The work is held against a hardened V-block by equal movement of 2 jaws controlled from an operating screw thus centering the work for all sizes within capacity of vise.



The vise will handle shafts or spindles $\frac{3}{8}$ to $3\frac{1}{8}$ " in diameter and any necessary length. Adjustable stop for locating work lengthwise is provided.

This is claimed to be an entirely new departure in vise construction, as it insures accurate radial cuts. Manifestly, it is a type of tool that should be very useful machine in all shops.

Sizes of bases are $8 \times 7\frac{1}{4}$ " and $8 \times 5\frac{1}{2}$ "; V-block is $4\frac{1}{2}$ " wide; Center height, vertical 5", horizontal $4\frac{3}{8}$ ".

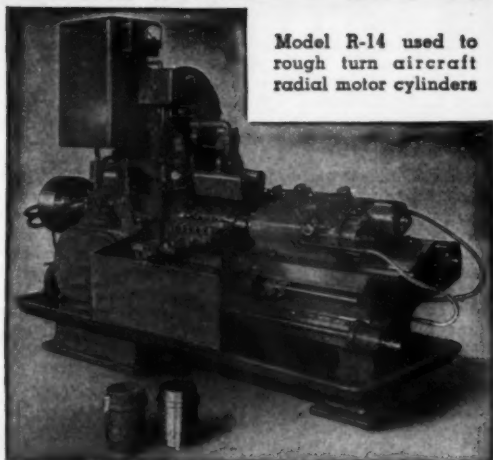
Lo-swing MODEL R-14 LATHE

A Big, Powerful Automatic for Armament, Aircraft, Truck and Tractor Work.

The Model R-14, with its generous capacity and weight, provides the power, rigidity and tool support necessary for heavy, multiple-tool turning. It incorporates the Seneca Falls Simplified Change-Over Mechanism as a built-in feature. This mechanism makes change-over from job to job merely a matter of a few minutes adjustment. Length of carriage stroke and rapid traverse adjustment may be varied without changing any cams.

Mass, rigidity and adequate tool support to stand up under heavy cuts are inherent structural features of the Model R-14 Automatic. Positive operation, wide flexibility and servicing simplicity are important advantages accruing from its typical Lo-

Model R-14 used to rough turn aircraft radial motor cylinders

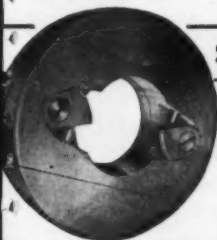


swing, 100% mechanical design with complete absence of clutches in the feed train. All rotating shafts are equipped with anti-friction bearings and are automatically lubricated. Carriage Ways are of wear-resisting Hardened Steel, thus assuring years of satisfactory service.

Model R-14 may be equipped with a Third Arm (overhead) as well as additional Back-Squaring Attachments, Carriages, Carriage Slides, and work handling devices. Send us your blueprints if you have a turning problem.

SENECA FALLS *Automatic* WORK DRIVER

Self Centering . . . Quick Acting . . . No Slip. Attaches to any chuck plate or spindle. Provides a positive, balanced drive which reduces chatter. Handles rough forgings or turned pieces—straight or taper. Eliminates dogging time. Reduces tool breakage. Write for details and size range.



SENECA FALLS MACHINE CO. SENECA FALLS, N.Y.

Handbook on Machining Aluminum

"Machining Alcoa Aluminum" is a new edition of a 48 page standard booklet on machining issued by Aluminum Co. of America, Pittsburgh, Pa.

The booklet sets forth the general principles of machining aluminum and its alloys; suggests speeds, feeds, and depths of cut which will produce satisfactory results; points out where practices and tools common to other metals may be used; and indicates where special practices or tools are desirable. Part 1 deals with general machine shop practice. Part 2 describes the practices employed in automatic screw machine operations.

Power Press Protection

To owners who must pay the cost of compensation, and to safety engineers and supervisors, directly responsible for safety of operators, booklet by the above title, has just been announced as available by Junkin Safety Appliance Co., 10th & Hill Sts., Louisville, Ky.

There are lots of power presses operating today, thumping out tokens of America's will to win this war. With many operators comparatively new and inexperienced, value of safety measures cannot be overestimated. It makes issuance of this book timely, and its 10 pages of press safety and maintenance information a definite contribution to the conservation of manpower.



DISTRIBUTORS WANTED *for the* HILCO CUTTER-GRINDER

(see opposite page)

High type men or organizations with right contacts in tool and machine shops to sell this urgently needed precision Universal Cutter-Grinder. Ingenious patented revolutionary construction, simplicity of design and low selling price obsolete existing equipment. Every shop will require one or more HILCO Grinders. Forty grinders sold from just two Blue Book ads. Exclusive territories granted. Leads from extensive advertising furnished. Opportunity of a lifetime for real workers. Permanent item. Very substantial earnings. Trip to factory for thorough instruction required. Capital investment in grinders and parts required to insure stability and quality of distributors appointed and to permit immediate delivery. Immediate action desired to close all open territories. Write or phone at once.

SHARP TOOLS

IN A HURRY!

LOWEST COST WITH TOP-MOST ACCURACY AND SPEED



EXCLUSIVE, PATENTED
**HILCO INDEX
DIVIDING HEAD**

(No other grinder has it.)
Permits fast set-up of any
conceivable angle — grinds
any type cutter to perfect
uniformity.

★ with a ★

Grinding 1 3/4 inch
Slotting Saw — one of
hundreds of adaptations.

HILCO *Portable* **GRINDER**

SPEED

ECONOMY

★ **ACCURACY** ★

—unlimited flexibility—low initial cost, only **\$495.00** — lowest operating cost.

So simple to operate—so compact—so easy to move anywhere on a moment's notice, the **HILCO CUTTER-GRINDER** is indispensable in any shop. It means sharp tools when sharp tools are needed—constantly!

Keep all your cutting tools always sharp!

Keep production at top pace! Avoid "dull tool" delays and losses! Keep costs down. The **HILCO Portable, Universal CUTTER-GRINDER** permits you to sharpen tools in a fraction of the time required by any other type grinder. No costly set-ups—no waiting

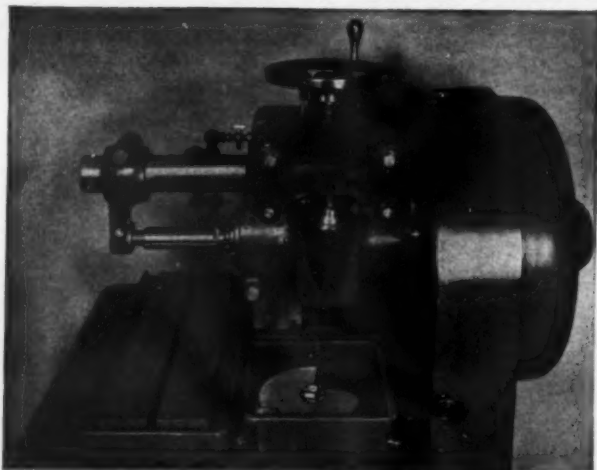
Write for Catalog

BERCO MANUFACTURING CO.

423 WEST SUPERIOR ST.
Phone: SUPERior 3937
CHICAGO, ILL.

**We Could
call it the**

V-Miller



... because of its natural application to successful Victory production of varied small parts. For high speed milling and kindred operations . . the U. S. MULTI MILLER is demonstrating its worth in general war production. For all 'round versatility . . the U. S. MULTI MILLER'S cam controlled action (featured in the close-up) is ideal. For less set-up time, for conserving on skilled labor, for fast automatic and semi-automatic production . . the U. S. MULTI MILLER is daily demonstrating its ability in the field. For index milling—grinding—vertical milling—spur gear cutting—hand milling—automatic cut off—continuous milling of bar or coil stock—rotary milling—contour milling—climb milling—blind milling—in fact, for all types of high speed, accurate war production . . the U. S. MULTI-MILLER is a proved efficiency tool! Bulletin describes all features in detail. U. S. Tool Company, Inc., Ampere (East Orange), New Jersey.



Multi

U.S. MILLER



"Tooling Up" for



Sundstrand Double End Milling and Centering Machine

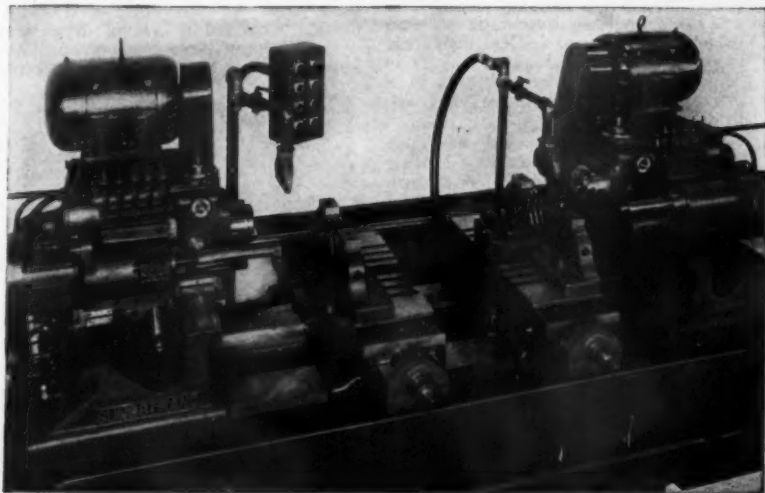
THE Sundstrand Machine Tool Co., 2535 Eleventh St., Rockford, Ill., has recently put into production a new Double-End Milling and Centering Machine suitable for milling to length and centering (in one handling) both ends of shafts ranging from $1\frac{1}{2}$ to 6" diameter by 14 to 72" long.

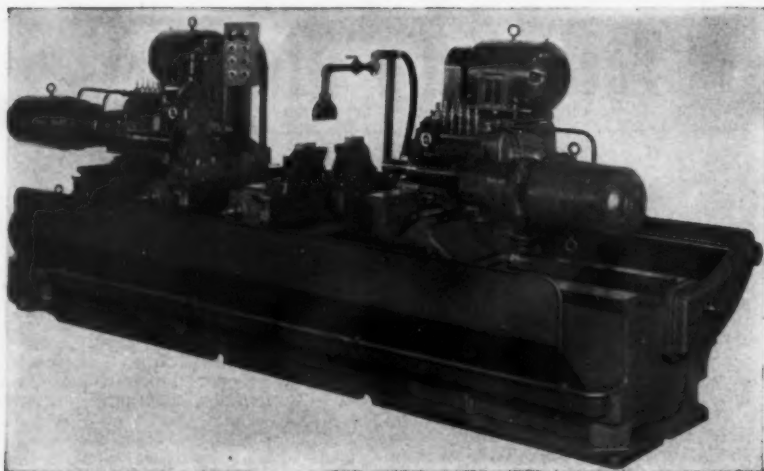
The machine base is a one-piece cast iron unit having horizontal ways. Crosswise to the bed ways are mounted two sub-bases. These in turn, have ways on which cross feeding heads are attached. The left hand sub-base is fixed but the right hand base is adjustable for handling various lengths of stock. Mounted to the bed ways between the 2 heads are 2 screw oper-

ated self-centering vises for holding the work. These vises also are adjustable for handling various lengths of stock. The drive to the heads is by means of a main drive shaft driven by a fluid motor. Each milling head is independently motor driven and carries a cam operated automatic centering spindle.

In a cycle of operation, the operator loads a shaft into the work holding vises. He then presses the cycle control button which starts cross feed of the heads toward front of the machine to mill both ends of the part to length.

At completion of the cross feed for milling, the heads rapidly return toward rear of the machine until the centering





spindles are in correct position and then stop. The centering spindles automatically travel longitudinally in a cycle of rapid approach, feed, rapid return, and stop. The cycle has then been completed and the operator unloads and reloads the work holding vises. The cycle is completely automatic so that one operator can run several machines. The parts are handled but once. Thus the milling and the centering is in a definite relation and can be very accurately controlled.

Electrically operated vises can also be provided further to simplify loading and unloading of the work. A feature of the machine is the use of Sundstrand hydraulic equipment including a tank unit, fluid motor, and valves to provide the automatic cycle for feeding the heads.

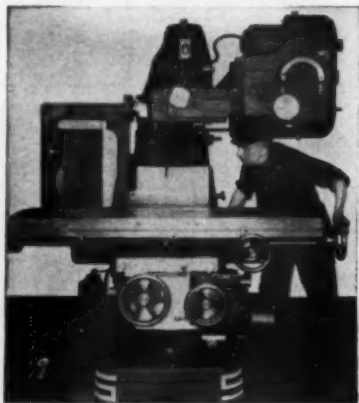
A similar type of machine can be provided for handling shafts 1 to 4" diameter by 8 to 48" long.

Shields No. 3 Vertical Universal

This versatile tool room and production machine is able to perform several varied operations, such as boring, milling and drilling on various faces of a

job at one set-up. Adjustability of the milling head at any angle, also enables the machine to do the work of a standard Universal Milling Machine, such as spiral milling.

Upper part of column contains a large bore for reception of a swivel drum. Attached to swivel drum is a worm wheel of large diameter, meshing with a worm mounted on ball bearings





Scrap salvage is a "must" for every plant

Information supplied by "Hitchcock's Machine Tool Blue Book"

Formerly, salvage was a matter of good plant housekeeping. Now, it is a patriotic duty.

Many excellent salvage plans are already in operation. No plant is too small to enlist in the war against waste.

A primary object is to utilize or reduce scrap. When short ends are used to make smaller pieces, the saving is equal to the difference between the costs of good and scrap materials. Where possible, reclamation of rejects offers a chance for worthwhile savings.

Careful segregation of scrap pays dividends. The junk man pays for gross weight

at the unit price for the inferior metal in each lot. Solid scrap has a higher resale value than chips. Ferrous metals should be separated into groups in accordance with the strategic alloy content. Color codes are helpful in this segregation.

Short stubs of welding rod may be returned to the welding supplier for credit. Wornout or broken dies, drills, punches and tools are salvaged and used in other ways, wherever possible. Cutting tools are being re-tipped with high speed steel or other hard surfacing materials. Bearing metals are collected and in many cases recast.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS. MOLYBDIC OXIDE—BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

Climax Molybdenum Company
500 Fifth Avenue New York City

Accuracy !

BEGINS AT THE BASE

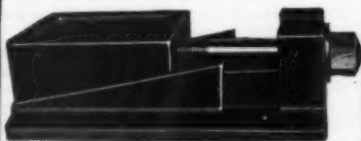
Scientifically designed leveling jacks for any equipment which demands extreme accuracy.



Standard Size No. 100A (base 6"x9", average height 2 3/4", top section 4"x4 3/4") will fit most requirements.

Extra large base & screw assures permanent accuracy. Angular faces are finished.

SPECIAL SIZES SUPPLIED ON REQUEST



IMMEDIATE DELIVERY

**JURZEK MACHINE AND
ENGINEERING COMPANY**

2305 Hilton Rd., Ferndale, Mich.

inside column. Swivel is securely clamped in any position by means of a large diameter flange acting as a brake. A locking drum fits over flange and is locked by means of a single nut. To change angular direction of spindle in a longitudinal direction, locking nut is loosened and head can be swung into new position by turning worm handle which is fitted with dial showing one turn as 5°. Head is swung in goose neck by like means. Dial on this handle reads 1 turn as 10 degrees.



Electrical controls for 3 motors are all in 1 large box built especially for this machine by Cutler-Hammer, with left to right switch for spindle and red light to show when motor is running. Push button switches control all motors. All cables to and from motors are concealed. Feed motor will not start with spindle idle and will stop when spindle is stopped.

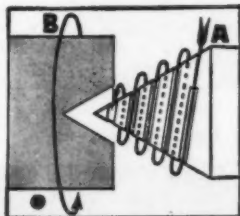
Spindle is driven by a 3 hp motor thru Reeves Variable Speed Pulley. Speed is shown by dial behind speed control wheel. Drive is either direct or thru hardened spiral gears. Back

ONLY



Helical Groove CENTERS

**GIVE YOU ALL OF THESE
COST-REDUCING ADVANTAGES**



* The exclusive left-hand helical groove constantly conveys supply of oil to the extreme point of the center and holds a reserve supply of lubricant. Since the lubricant flows to the bearing surface in the same direction (see A above) as that in which the work is turning (see B), the capillary action draws the lubricant into the work.

CMD CENTER POINT LUBRICANT

can withstand pressures greater than 50,000 lbs. per square inch. Try it once! You'll use it regularly!

• **GREATER MACHINE OUTPUT** The advanced design* of CMD Helical Groove Centers assures *more complete and longer-lasting lubrication* of point and work. No more burned-out center-points! No stopping machine to relubricate center! No readjustments of tail stock!

• **RIGIDITY FOR PRECISION WORK** Because CMD Helical Groove Centers do *not* turn with the work, there are no rollers, balls, or races to wear out and throw the support for work out of alignment. The work turns on a film of oil, which is constantly replenished from the supply in the helical groove.

• **LESS POWER CONSUMPTION** By reducing frictional heat to the minimum, CMD Helical Groove Centers prevent excessive expansion of work (a common cause of high power costs). The lubricant on work and in groove also helps to expel heat generated by cutting tools.

Write for FREE Sample Kit

CHICAGO MANUFACTURING & DISTRIBUTING COMPANY

Dept. 10-BB, 1928 West 46th St., Chicago, Ill.

- ☐ Send circular on CMD Helical Groove Centers
- ☐ Without obligation to us, send **FREE** sample kit containing a tube of CMD CENTER POINT LUBRICANT and a tube of CMD CENTER POINT LUBE (grease) with directions for making an amazing, simple test.

NAME

FIRM NAME

ADDRESS



**IT WILL PAY YOU TO
INVESTIGATE
OUR PRECISION TOOLS !**



**M & L No. 1
Precision Tapper**

**Efficient and
Accurate**

**Taps guided by
precision leads.**

**Used by many large
U. S. manufacturers.**

**Available in pedestal
or bench models**

Precision tapping on a production basis. Class 3 and 4 specifications easily met. A high quality machine with 4 speeds, 95 to 395 RPM and dial indicator for bottom tapping. Ball bearings throughout. Equipped with coolant pump system. No skilled operators necessary—sensitive touch—minimizes 'rejects'.

INTERNATIONAL INSIDE MICROMETERS



**HIGHEST ACCU-
RACY AND FINEST
WORKMANSHIP**

Available in 2
sets: 1½"-6" and
1½"-12" includ-
ing case and han-
dle. Accuracy un-

conditionally guaranteed.

M & L POSITIVE OFFSET BORING HEAD 0-15".
New "HANDY KNURLER", used like pair of pliers.
BRAND TELESCOPE GAGES ½" - 2½" capacity.

Write for complete information to:

BRAND TOOL & SUPPLY CO.

formerly Pacific Tool & Supply Co.

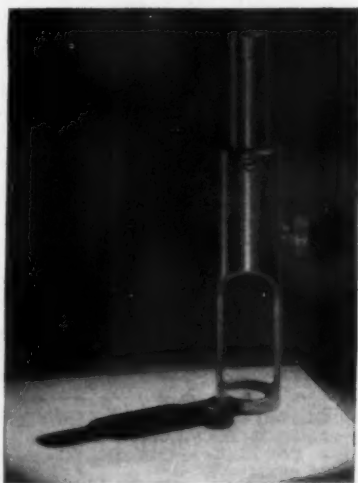
344 N. Vermont Ave. Los Angeles, Cal.

gears and clutch are thrown in and out by a single lever; the 2 movements being connected by a link mechanism. A 4-speed sliding gear transmission is incorporated in head for spindle power feeds of .005 .007 .010 and .014" per revolution.

Spindle is of Nickel Molybdenum steel, hardened and ground, supported by duplex super precision ball bearings at the nose, with another precision ball bearing in the middle and a double row precision bearing at the end. It can be moved by hand or with power feed.

Power feeds and rapid traverse are provided in all directions with directional control. A 1-hp motor supplies power for these feeds. Rate of feed can be varied by turn of a hand wheel with rate shown by a dial behind it. All ways are protected by Neoprene wipers. Pump is mounted on outside of machine.

The Center Master



An entirely new type of locating and centering tool that is particularly effective in accurately centering layouts to spindle, is announced by the Center Master Division of the Center Scope



GET THE JOB DONE !



You can RELY on Marshalltown Presses TO STEP UP YOUR PRODUCTION ! They are engineered and built to give you the best in dependable, trouble-free service, and they incorporate many outstanding advantages. Features of design include more die space—chrome molybdenum cranks, wrist pin connections.

Yes, for better production—for longer life—for the MOST FOR YOUR MONEY—choose

MARSHALLTOWN PRESSES

*Get the facts today
about Marshalltown*

*Presses. Send for literature of the complete line
capacities from 5 to 70 tons.*

MARSHALLTOWN MFG. CO.

900 E. NEVADA ST.,

MARSHALLTOWN, IOWA

End that Coolant Handling BOTTLENECK

With Eastern Coolant Pumps your machines can be stepped up to maximum production without any worries about the coolant handling. Assured-flow construction features guarantee long, trouble-free service. Eastern Coolant Pumps need no attention from the machine operator.

Remember Model 16-S, the "Midget" of our line, for small coolant handling jobs. Delivery, 2 gallons per minute against 3 pounds pressure.

Assured-flow features

- ★ Open-type impeller providing adequate clearance for passage of chips and abrasives.
- ★ Motor armature, shaft, and pump impeller is an integral unit, assuring perfect alignment.
- ★ Large down-flow intake port eliminating any possibility of pump becoming airbound.
- ★ Bearings above the fluid level where they cannot be affected by abrasives in the coolant.

Write for complete information
EASTERN ENGINEERING COMPANY
42 Fox St., New Haven, Conn.

Instrument Co., 351 South La Brea Ave., Los Angeles, Cal.

According to the manufacturer, this new Center Master reduces the number of steps necessary in locating and centering work to spindle axis. It is said to increase accuracy because it compensates for spindle and adapter run-out, and because it is easier for the operator to center his work lines between the scribed lines on the locating glass.

It's simple in construction and operation yet extremely accurate and easy to use. Overall length is $3\frac{1}{4}$ " with a $\frac{3}{4}$ " spindle shank 1" long. Has a knurled trimming screw for compensating run-out.

It is claimed that there is no parallax and that every operator, even "green" trainees, can do better, more accurate work with this patented device. It's not a delicate instrument to be kept under lock and key, but rather one to be kept on the work bench ready for instant all 'round use. Packed in a wooden box, moderately priced to the average machinist, it is suggested that it be consistently used for work locating from layouts.

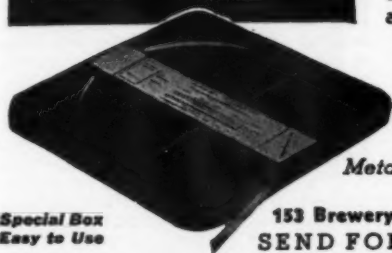
Gear Chuck Speeds Work



The Cotta Speed-Chuck, originally developed and now offered by Charles Cotta, 1712 Harlem Ave., Rockford, Ill. is a practical gear manufacturer's solution to the problem of holding spur

★ CONTOUR CUTTING with ATLANTIC Band Saw Blades *speeds production*

Atlantic Metal Cutting Band Saw Blades have been developed through twenty years of research and specialization.



**Special Box
Easy to Use**

**ATLANTIC
SAW MFG. CO.**

*Metal Cutting Band Saws
Exclusively*

153 Brewery St., New Haven, Conn.
SEND FOR FREE BOOKLET



WAR PLANTS Steel Boxes for Your Production Needs



SHOP BOXES—Straight Side

No. 401—10"x16"x6"—18 Gauge—\$.85 ea.

No. 402—12"x18"x8"—16 Gauge—\$1.10 ea.

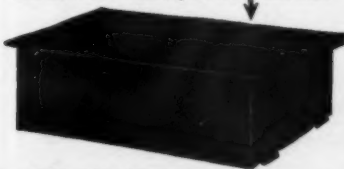
A straight side shop box with rigid handle and hook hole each end. Excellent for shop use where stacking feature is not required.

STACKING BOXES

No. 601—10"x16"x6"—18 Gauge—\$.95 ea.

No. 602—12"x18"x8"—16 Gauge—\$1.25 ea.

An ideal all-purpose shop box. Sturdy all-welded construction. Heavy skids act as a positive stacking lock and re-inforce box at point of maximum wear.



PRICES F.O.B. FACTORY, PHILADELPHIA—ANY QUANTITY!

ORDER TODAY—WIRE WRITE OR PHONE—PROMPT SHIPMENT

AMERICAN METAL WORKS, INC.
1518 GERMANTOWN AVE., PHILADELPHIA, PA.

or helical gears for hub, hole, or face grinding and other comparable operations. Loading and unloading time is reduced to a minimum because the gear is simply set into the chuck where a slight turn causes it to be gripped firmly by a set of hardened and ground pitch-line pins. These pins bear against a set of accurately ground eccentric cams which are placed to tighten against the normal direction of rotation. The gear is released by a slight turn in the opposite direction. The saving in time over ordinary chucking and alignment procedure can be appreciated.

The maker emphasizes that with this chuck, alignment is automatically accurate because the pins are sized to bear at the pitch line and the cams are carefully ground to assure concentricity. Each Speed-Chuck is specially designed and built for the job on which it is to be used, which makes it primarily a tool for production jobs. Various types are available for single or cluster gears, and sizes range from 3 up to 36" diameter.

War-Time Bearing Metals

A new bulletin on bearing metals, which is particularly timely in view of war-time restrictions on tin-base babbitts is available. It describes various lead-base metals which have been found exceptionally long-wearing on shock loads, on heavy sustained pressures, and on general service; and have proved to be excellent substitutes for tin-base bearing metals. Two useful features of the bulletin are a number of practical suggestions for best results in making and maintaining journal bearings, and a table of recommendations for selecting the correct type of bearing metal for 135 different types of machinery. In addition, the bulletin also describes Isotropic Bronze Bushings, die-cast by the crystal control method which is said to produce a more homogeneous and stronger structure than that of ordinary bronze bearing stock.

Copies may be obtained by addressing Magnolia Metal Co., 18 West Jersey St., Elizabeth, N. J.

HOWE-LINDSEY AUTOMATIC SAW FOR RECONDITIONING SHARPENER

- HACK SAWS
- BAND SAWS
- MEAT SAWS
- METAL SLITTING SAWS, ETC.

Designed to sharpen hack saw blades, metal saw blades, circular saws, metal slitting saws and milling cutters up to 5/16" face. Write for circular.



HOWE AND SON, INC.

HINSDALE, N. H.

MAKE SPRINGS

in a jiffy! with
Blaner Universal Hand SPRING WINDER



Patent No.
2052443

Write for your
Circular.

Here's a profitable tool room unit. Quickly makes hundreds of sizes of springs. Sturdy, dependable... a real time and money-saver.

Illustrated is No. 4 Universal with adjusting shaft of 5/8" square. Takes wire up to 1/4" diam.

THE JOHN BLANER CO.

Corner Meek & Elm, Sharon, Pa.

Welds all sides down-hand with only one set-up

Place the weldment, regardless of size or shape, on a C-F Positioner. "Tack" it to the table and the welder can finish the job alone—can weld all sides down-hand without further crane work or jacking-up. With a C-F Positioner the welder himself rotates, twists and turns the heaviest and most cumbersome weldments with a push button control—can lay every fillet down-hand, assuring stronger, smoother, flawless welds "all over" easily and quickly.

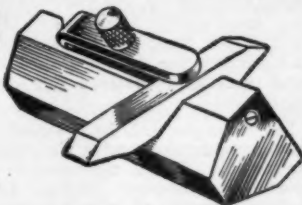
Only the universal, multi-purpose C-F Positioners, both portable and stationary, are pedestal-mounted. The entire positioner can be rotated on its base to give maximum floor clearance or convenience and is adjustable for height. Platen rotates full 360° and tilts to 135° from horizontal. Hand or power operated from 1200 lb. capacity up.



Write for new
bulletin WP 22.

CULLEN-FRIESTEDT CO.
1321 S. KILBOURN AVE.
CHICAGO, ILLINOIS •

GRIND THREAD-CUTTING TOOLS FASTER - ACCURATELY with the ACRO MASTER GAUGE . . .



★ You know the necessity of accurately ground INTERNAL and EXTERNAL thread-cutting tools. Moreover, you know that such grinding operations required skilled operators.

Now, with the new ACRO MASTER GRINDING GAUGE, the same truly accurate grinds can be obtained by ordinary unskilled workmen. This is possible because the Acro Gauge positions the tool bit on the surface grinder in the CORRECT position ONLY. No misfits. Every grind must be uniformly accurate . . . exact duplicates.

Get this valuable time-saver. Save on skilled man-hours. Assure yourself of better, faster, flawless thread-cutting operations. Order the Acro Master Grinding Gauge TODAY.

See your Jobber or write direct

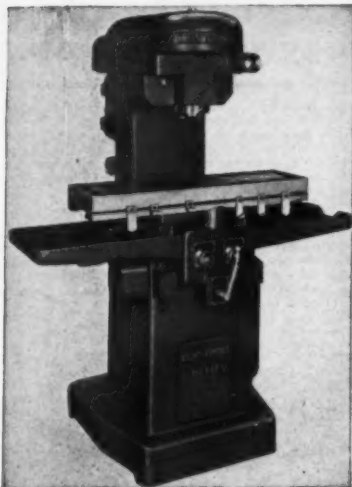


ACRO TOOL AND DIE WORKS

5324 N. KEDZIE AVE. • IRVING 8500 • CHICAGO, ILLINOIS

Precision Machinists • Tools • Dies • Metal Specialties

Vertical Miller



Designed for today's increasing demands for production - line methods, newly-announced No. 1-14V Vertical Milling Machine by Kent-Owens Machine Co., 968 Wall St., Toledo, O. is built especially for rapidly performing vertical milling operations on small parts.

It has a simple, infinitely adjustable hydraulic table feed with full automatic cycle. Table movements are effected by convenient control, lever indicating direction of table movement. Graduated dials, infinitely adjustable provide any feed rate within range of 1 to 40" per minute.

Table has feed and rapid traverse in both directions, automatic shift from rapid traverse to feed in either direction and automatic reverse at both ends of stroke. Hence, practically any desired cycle can be obtained, such as milling work at one end of the table while unloading and loading the other. Dogs can also be provided for intermittent milling.

A floor-type machine, the box-type bed completely encloses motor and hy-

draulic pump unit, for actuating table. Table rides directly in ways on bed. Both spindle head and head carriage are 1 piece castings.



Spindle head has cross adjustment by means of a screw with micrometer dial. It moves in long narrow ways in the head carriage. The head carriage is adjustable vertically on 2 ground cylindrical steel posts by a screw micrometer dial. Design is claimed to provide unusual rigidity because work and cutter are closely coupled regardless of the size of work.

Ten spindle speeds ranging from 115 to 300 rpm are quickly available. There are no gears in the spindle drive, this being entirely by V-belts from standard foot-mounted motor mounted on rear of spindle head. Interchangeable V-belt pulleys are used with intermediate adjustable pulley to provide full speed range and keep belts in proper tension. Spindle speed changes are made simply by raising hinged cover on spindle head and properly setting V-belts.

Machine can be equipped with either 1 or 2-way positive stop with dwell. With this arrangement the work is fed into the cutter to a fixed positive stop.



Drawn for Office of War Information



INDUSTRIAL DIAMONDS FOR

Truing Grinding Wheels

Illustrated is the CRYSTAL type or OCTAHEDRON diamond. By simply resetting the diamond when dull a new hard corner is exposed and its cutting efficiency restored. Both African and Brazilian diamonds shipped promptly from stock in any size or design of steel holder.

For Information and Circulars Please Write

F. F. GILMORE & CO.

112 Dartmouth St., Boston — — 2834 E. Grand Blvd. Detroit



BUILDERS 'T' SURFACE GRINDER

The ideal, inexpensive, hand-operated grinder for small parts (see photo), tools, dies, and 1001 other small grinding jobs.

*Write for
Bulletin 644.*

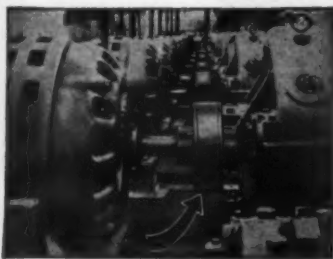
**BUILDERS
IRON FOUNDRY
21 Coddington St.,
Providence, R. I.**

Shutdowns Reduce Output -Here's A Way To Avoid Them

The loss you would suffer in output by being forced to shut down a Productive Machine for repairs would probably be greater today than at any time in your history—why not guard against such shutdowns by using **KANTI-LEVER COUPLINGS**? They have a Cushion Torque that protects your Productive Machines, your Gears, Motors, Speed Reducers, Bearings, etc. by absorbing the constant vibration and sudden load shocks that cause gradual deterioration and finally shutdowns and rush repairs. They likewise protect you against the evils of shaft misalignment the same as does the ordinary Flexible Coupling. The cut below shows 70 **KANTI-LEVELERS** that have run for 18 years and during that time have paid back their first cost many times over by reduction of repair bills and prevention of shutdowns.

Send for Bulletin 28-B describing

KANTI-LEVER COUPLINGS



BROWN
ENGINEERING CO. 126 N. THIRD ST.
READING, PA.

Eutectic Welding Book

High temperature in oxy-acetylene and arc welding may create stresses likely to present a hazard in machined parts. Castings may become distorted. Same holds for sheetmetal welding, and particularly in machine and tool repair, and salvage operations. Changes in metallic structure, likely to be set up around welding zones, are another hazard of high-temperature welding.

Advanced as largely avoiding such weaknesses, is eutectic (low temperature) welding, specialty of Eutectic Welding Alloys, Inc., 40 Worth St., New York, who makes Castolin eutectic alloys and their autochemic fluxes, for use in oxy-acetylene, gas torch, metallic arc, carbon, induction, resistance and furnace welding.

The firm's new handbook, "Welding's Greatest Advance," is an exhaustive treatment of the subject of eutectic welding virtually from ground up to most recent developments. Sized 8½x 11", it has 36 pages filled with data and explicit, illustrated details of typical jobs and applications, which should make an important addition to files of engineering offices.

Automatic Reduced Voltage Starters

A new, 16-page bulletin describing its line of automatic reduced voltage starters is offered by Allen-Bradley Co., 1311 S. First St., Milwaukee, Wis. It contains a complete discussion of factors that enter into selection of automatic reduced voltage starters for squirrel cage motors.

The bulletin also includes a description of Allen-Bradley Bulletins 740, 741, 742, 746, and 747 automatic resistance starters of various types and sizes. Several incorporate Bradleyunit graphite compression resistors, consisting of an insulated steel tube filled with graphite discs. Resistance of this type of resistor is changed simply by applying pressure upon the discs. Stepless adjustment of motor current is thereby obtained.

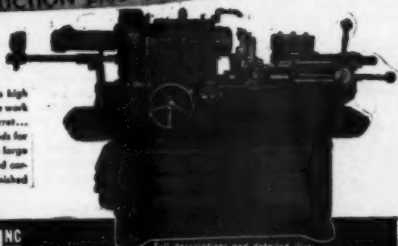
The MOREY 2G

Back-Geared
TURRET LATHE
Timken Bearing
Self-Locking Turret—Infinite Spindle Speeds

CAPACITY
(Automatic Chuck (round) 1")
Swing over cross slide 6"
Swing over bed 14"

Features **HIGH SPEED PRODUCTION PLUS OPERATING ECONOMY**

The MOREY 2G Timken Bearing Turret Lathe insures today's high speed production with a minimum of operating expense. More work at less cost with those money saving features: Self-Locking Turret... Vibrationless precision with an infinite variety of spindle speeds for every job... Back Gears instantly thrown in through extra large Twin Disc Clutch... takes full advantage of high speed and carbide tools. Modern design for modern production. Can be furnished with tooling.



MOREY MACHINERY CO., INC.

410 BROOME STREET • NEW YORK, N. Y.

Full descriptions and detailed illustrations are shown in Circular 620 Ask for it TODAY.

HOPPERS

**THE FASTEST FEEDING
HOPPER EVER DESIGNED**

Feeds Screws, Screw Blanks,
Nuts, Rivets, Pins, Bearing
Rollers, Plain Washers, Discs,
Bullet Cores, Special Parts.

**Hoppers Adaptable To
Any Machine.**

**Send Sample Parts For
Feeding Speed.**



DETROIT POWER SCREWDRIVER CO.
2809 W. FORT ST., DETROIT, MICH.

New UNIVERSAL PORTO- HOLDER

Saves time and money
wherever portable
power tools are used
for bench assembly.

Here are the reasons why:

Speeds up production, stops costly tool
breakage, eliminates worker fatigue, and is
adaptable to any tool. Very simple and effi-
cient, compact and rugged, complete versa-
tility and requires only 5 minutes to set up.

Write for further details

John Nielsen Engineering Co.
South Beloit Illinois



WIREGRIP Belt Hooks

Have extra (patented) aligning cards
that hold all hooks in position pre-
venting card and waste—every
hook is used.

STEELGRIP

Flexible Lacing (the type applied
with a hammer) in convenient boxes
or long lengths with 2-piece hinged
recker pins.

Prompt Delivery on both types.

Write for Circulars

ARMSTRONG-BRAY & CO.

"The Belt Lacing People"
5364 Northwest Highway, Chicago



GRAHAM MULTI-PURPOSE VISE



Sold plain
or with jig
attachments.

with Attachments that convert it
to a ready-made jig or fixture

For holding all sorts of repeat-operation
work on drill press, radial, miller, shaper,
planer, grinder, this versatile vise serves
as a ready-made fixture by means of special
jaws and attachments we furnish. Finished
to accurate parallels and right angles. Also
sold plain (drilled for adding attachments
later.)

ASK ABOUT OUR KNURL HOLDER
FOR LATHE TURRET

Request Illustrated Price Circulars

THE GRAHAM MFG. CO.

52 BRIDGE ST. EAST GREENWICH, R. I.

Ithaca Toolmaker's Compass

Designed to overcome the difficulties
encountered in attempting to scribe
small circles from a few thousandths
up to $\frac{1}{4}$ " radii, a handy new compass
has been developed by Ithaca Scientific
Instrument Co., Ithaca, N. Y.



The center is stationary. Compass
body is free to slide up and down on
it, and to rotate about it. A hardened
lapped bushing assures accurate slide
fit of pivot needle in compass body.
A convenient worm clamp nut locks
worm gear after setting. A knurled
nut at the top is used for setting ra-
dius. A pencil adapter gives the
draftsman an improved rivet compass.
Full details are given in a bulletin.

Bulletin on Dynamic Balancing

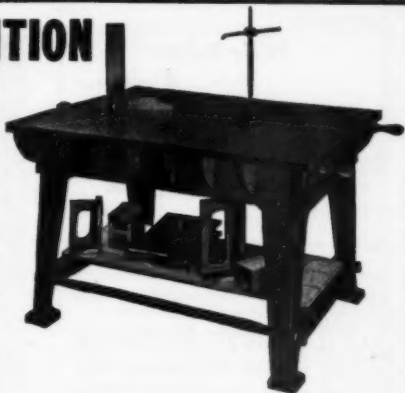
In addition to complete descriptions
of the many Bear Dy-Namic Balancing
Machines available for balancing arm-
atures, fans, wheels, gears, etc., this
booklet contains concise data on Dy-
Namic Balancing and its importance
in eliminating noise and premature
wear due to excessive vibrations re-
sulting from couple action. Booklet
explains Bear Dy-Namic Balancing
principles. Address Bear Mfg. Co., In-
dustrial Div., Rock Island, Ill.

A USEFUL ADDITION

Modern precision machine shops and inspection departments will find this sturdy 36"x 48" MILWAUKEE SURFACE PLATE a valuable addition. Constructed of semi-steel, accurately machined, securely mounted on cast legs which are machined and provided with SAE adjusting screws for perfect alignment. Height from floor to top of plate 30". Can also be had in 38". Shipping weight 1200 lbs.

We also manufacture angles and parallels as shown underneath surface plate.

We also make larger and smaller plates either with planed or scraped surfaces, whichever is desired. Write today for full information.



J. C. BUSCH COMPANY

ENGINEERS AND MACHINISTS
SINCE 1907

165 SO. BARCLAY ST.

MILWAUKEE, WIS.

CENTRAL

**Developed and Perfected
by America's Only Makers
of Micrometers Exclusively**

All sizes up to 6 inches available
with graduations by thousandths
of an inch.

All sizes up to 4 inches are also
available with graduations by ten
thousandths of an inch.

Central

THE CENTRAL TOOL CO.
AUBURN...
RHODE ISLAND

MICROMETERS OF CERTIFIED ACCURACY

THE CENTRAL

*Certified
Accuracy*

MICROMETER

WARRANTY

The micrometer is warranted to be accurate and to conform to government standards. If for any reason you find it does not agree with your standards, and full purchase price will be refunded.

The purchase of return is valid in case of breakage, damage or other cause not covered in the said warranty.

The Central Tool Co.
MICROMETERS OF CERTIFIED ACCURACY
AUBURN, RHODE ISLAND

Screw Machine Cams

IMMEDIATE DELIVERY

George L. Detterbeck Co.
Formerly Banner Mfg. Co.

1671 Clybourn Ave. Chicago, Ill.



Have you our Engineering Data
Sheets on the new line of

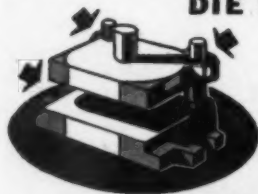
BABY GUSHER Machine Tool Coolant Pumps?

Made in four types; 1/30 and
1/10 h. p. for small machine
tools and machines requiring
from 4 to 10 G. P. M.

Write for descriptive literature.

The Ruthman Machinery Co.
1819 Reading Rd., Cincinnati, Ohio

DANLY PRECISION DIE SETS



**Danly
Commercial Sets
Danly
Special Sets**

**THEIR
PRECISION**
Means Greater
Accuracy
In Your
Production

DANLY MACHINE SPECIALTIES, INC.

2100 S. 52nd Avenue, Chicago, Ill.

MILWAUKEE • LONG ISLAND CITY, N. Y.

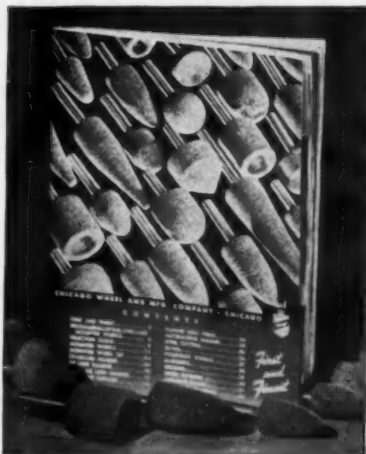
BAYTON • DETROIT • ROCHESTER

CLEVELAND • PHILADELPHIA

Ducan Metals & Supply Co.
Los Angeles • San Francisco

DANLY PRECISION DIE SETS

Mounted Wheel Manual



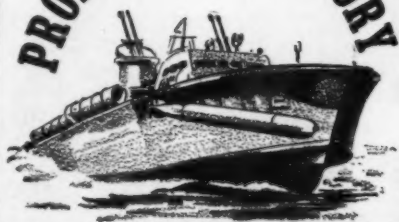
A volume which will doubtlessly be
accorded a welcome in every shop
library is the new manual by Chicago
Wheel & Mfg. Co., 1101 W. Monroe St.,
Chicago, now ready for distribution to
interested parties.

Distinction in the illustrations has
been achieved thru showing the firm's
products accurately (within .001") and
in full colors, according to A. T. Dal-
ton, Secretary.

Listed is a wide variety of time-
saving accessories for use with portable
equipment. Included are mounted
wheels, steel cutters, drills, (special
type) polishing wheels, small wire
brushes and many other items.

The book offers for the first time in
print, according to Dalton, concise and
detailed information on selection and
use of mounted wheels. Edited along
the war pattern, many practical setups
are given. Particularly of interest is
the section on mounted wheels, giving
comprehensive data covering the
grinding of all classes of materials with
mounted wheels. Applications to vari-
ous war-production jobs are illustrated.

PRODUCTION *for* VICTORY



Wherever our boys fight
... on land, sea or in the air
... **RITCO** products are
there, too, serving America
on her many battle fronts.

**SPECIAL BOLTS,
NUTS and STUDS**

**DIE SINKING and DROP FORGINGS
SCREW MACHINE PRODUCTS • HEAT TREATING
SPRAYED METAL EQUIPMENT**

Estimates gladly submitted. Send samples or blueprints. Catalog on request.

RHODE ISLAND TOOL CO.
148 West River St., Providence, Rhode Island
Serving American Industry Since 1834

RITCO

**WANTED: BOYS OR GIRLS TO SHARPEN SMALL DRILLS IN WAR PRO-
DUCTION PLANT. NO EXPERIENCE NEEDED**

BLACK DIAMOND PRECISION DRILL GRINDERS

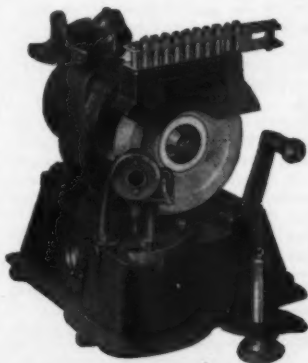
The above advertisement could well be yours, because anyone can sharpen small gauge or fractional drills on a Black Diamond Grinder.

Motor driven, these highly efficient machines are doing yeoman service in large and small war production plants throughout the country.

They not only produce quantities of perfectly sharpened drills, with lips of uniform length, correct angle and proper clearance for true, accurate drilling—but release skilled mechanics for more important work.

The Web thinner, an important attachment, cares for the proper grinding of Notched, Colton or so-called Crankshaft points . . . and the diamond dresser keeps the grinding wheel always sharp.

Write for Bulletin 122!



BLACK DIAMOND SAW & MACHINE WORKS, INC.
NATICK, MASS.

DARNELL

CASTERS & WHEELS



Precision-made Darnell Casters with the DOUBLE BALL-BEARING SWIVEL assure a long life of efficient, economical service

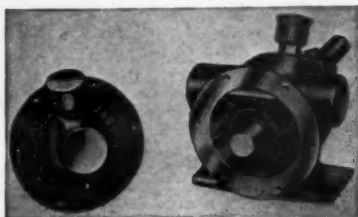


DARNELL
CORPORATION, LTD.

LONG BEACH, CALIF.
36 W. CLINTON, CHICAGO
60 WALKER ST., NEW YORK

Jabsco Coolant Pump

A new type of self-priming pump with but one moving part is announced by the Jabsco Pump Co., 8302 Wilshire Blvd., Beverly Hills, Cal.



Designed to pump either thick or thin coolants, it is recommended for the handling of coolants that may have become contaminated with abrasives.

The pump is extremely simple in construction and operation — a single Neoprene synthetic rubber impeller is the only moving part. Pumping action is said to be positive and it does not require priming each time machine is started.

All parts except impeller are of bronze—there are no adjustments and no gears to clog or become noisy when worn. According to the manufacturer, a feature of the pump is that the Neoprene impeller allows a certain amount of solids to pass thru without clogging or injury, while the single moving part cuts operating costs and lengthens life of pump.

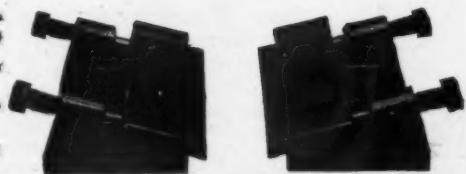
The pump is particularly adaptable to fields wherein pressure requirements are low. Mounted at any angle, it can be operated in either direction. It is available in 1/4" to 3/4" sizes with capacities from 2 1/2 to 22 gpm.

A 6-gallon tank, motor and pump have been combined into one easy-to-carry portable coolant unit for use with drill presses, lathes, grinders, saws, tappers and milling machines.

"Keep 'em Flying"

Buy U. S. War Savings

Bonds and Stamps



HART'S Divided Machine Vises

These Vises will hold work the full length of the table, if necessary. Useful on planer, milling machine, surface grinder or drill. They adapt themselves to any shape and can be used on sides of table as well as ends. The Jaws are tool steel and hardened, the angle holding the work down on the table.

Size of Base.....5x7 inches
Size of Jaw.....3x6 inches
Height at highest Point.....2½ inches

When writing for descriptive circular kindly mention the BLUE BOOK.

HART MACHINE CO.
26 Mather Street, - Dorchester, Boston, Mass.

HART'S Milling Fixtures

These fixtures will make themselves popular and profitable in your shop. Easily kept clean to receive the work. May be used in either horizontal or vertical position. Suitable to hold round, hexagonal, octagonal, or square stock, aligning the work with the machine. Grip holds the work on the bottom as well as on the back. Shipped in pairs, unless otherwise ordered. Made in 4 sizes—¾" to 4".



RICKERT-SHAFER

Specialists

IN
THREADING
TOOLS



**AUTOMATIC
DIE HEADS**

**COLLAPSIBLE
TAPS**

**BORING
HEADS**

**FRICTION
TAPPERS**

**SPECIAL
THREADING
MACHINES**

The RICKERT-SHAFER Co.
ERIE, PA.

THE 1st

REALLY HIGH-SPEED GRINDER
WAS

KIPPair GRINDER

NOW THE NEW MODEL

H

KIPPair GRINDER

Madison-Kipp tool-makers originated the first really high speed grinder. They know a great deal about the practical side of grinder design and grinder usage. They think the new Model H is the best all around off-hand tool they have ever tried and we are sure you will agree with them. It's fast (50,000 R.P.M.), more powerful, and has a handier grip. If you are doing priority work, Order Today!

Please attach preference rating certificate with order.

\$29⁷⁵

MADISON-KIPP CORPORATION

207 Waubesa Street, Madison, Wisconsin, U. S. A.

"Save Manpower for Warpower!"

That is the theme of the 31st National Safety Congress and Exposition, to be held in Chicago Oct. 27-29. The first wartime Congress since 1918 will be devoted completely to the safety job now at hand—to help win the war.

The entire Congress program, covering every phase of safety with 175 sessions and 50 program participants, will be centered on the problem of stopping accidents that delay victory by slowing production, impeding the movement of troops and supplies, and wasting manpower, material and time.

The Congress is the annual convention of the National Safety Council. It is the largest safety event in the world. Attendance averages 10,000, and safety leaders from all parts of the country assemble to exchange ideas, experiences and problems. Delegates this year will work overtime to cram the program into 3 days, instead of the usual 5, and thus avoid week-end travel.

The 1942 Congress comes in the midst of a nationwide war emergency safety campaign being conducted by the Council at the direct request of President Roosevelt.

Headquarters for the Congress will be the Hotel Sherman in Chicago, but sessions also will be held in the Morrison and LaSalle hotels.

An exhibit of all types of safety appliances and equipment will be featured.

Stain, Tarnish and Rust Remover

Industrial Chemical Products Co., 3777 Bellevue Ave., Detroit, announces Sol-Klean for use in the metal working industries. It is claimed that this product will fill a long felt need for a safe, easy, non-corrosive material for removing stains, tarnish, rust and burned spots from tools and equipment. It also may be used to neutralize and clean soldered and welded joints.

Sol-Klean is a non-inflammable, non-toxic and non-corrosive material and may be applied with a dampened cloth or may be brushed on then wiped with a dry cloth.



STURDY BUILT *for Long, Hard Service*

BALDOR builds a complete line of Bench and Pedestal type grinders — 6" to 12" wheels. (At left, is special Carbide Tool Grinder, 6" wheels, complete for \$95.00).



ASK FOR
BULLETINS

BALDOR ELECTRIC COMPANY
4368 Duncan Ave., St. Louis, Mo.

BALDOR

BALL BEARING GRINDERS

COLBORNE *Speed Lathes*



**SPEED-UP FINAL OPERATIONS
ON DIES, GEARS, SCREWS
LONG RODS, SHAFTS**

For economical polishing, lapping or finishing of gears, shafts, dies, gages, ball races, long rods, etc.

Built to meet the requirements of those desiring a heavily constructed, smooth running machine of highest quality.

Has one H.P. built in motor with variable speed control, using RKEVES standard pulley and belt.

Smooth automatic brake acts instantly when switch is thrown.

Collets or chuck may be used.

GOOD DELIVERY

Write today for details

Machinery builders since 1879.

COLBORNE MFG. COMPANY

157 W. DIVISION ST., CHICAGO, ILL.

New!



DUPLEX-B-M COMBINATION Band and Disc Grinder

Improved and streamlined — heavily built for increased production and lower finishing costs.

Motor Driven Ball bearing throughout—Fully enclosed adjustable drive. Large disc grinding table.

Write for illustrated folder for this and other size grinders.

WALLS SALES CORP.

96 WARREN ST. • NEW YORK, N. Y.

Uncle Sam Needs Metallurgists

The Civil Service Commission is recruiting metallurgists under 2 new examinations recently announced: — No. 238 for positions paying \$2,600 to \$5,600 and No. 254 for junior grade positions paying \$2,000.

Requirements of the examinations have been modified and college teaching in metallurgy is now accepted as professional experience.

For higher grade positions (\$2,600 to \$5,600) the requirements now are:— completion of a 4-year course with major study in metallurgy or closely allied subjects and a minimum of 2 years of professional experience (which may include college teaching) in metallurgy. Additional experience will be required for the higher grades.

For junior grade positions (\$2,000) requirements are:—(1) completion of a 4-year college course in metallurgy or metallurgical engineering; or (2) completion of a 4-year course in an allied subject supplemented by (a) one year of paid experience in metallurgy (which may include college teaching), or (b) 15 semester hours in metallurgy or metallurgical engineering, or (c) 2 War Training Courses in metallurgy. Applications will be accepted from college senior or graduate students who expect to complete the required courses within 6 months after filing applications.

Announcements and application forms may be obtained at any first- or second-class post office or from the Civil Service Commission, Washington, D. C.



STOP DUST from All Kinds of GRINDERS with **DUSTKOP**

DUSTKOP collects dust from Surface, Tool and Precision grinders . . . Compact, self-contained . . . Operated by ¼ hp continuous duty motor and fan . . . Easily renewable, spun glass filters clean air . . . **LOW IN PRICE . . . Immediate deliveries of standard units on high priorities.**

AGET-DETROIT MFG. CO.

2042 Book Tower Cadillac 3090 Detroit

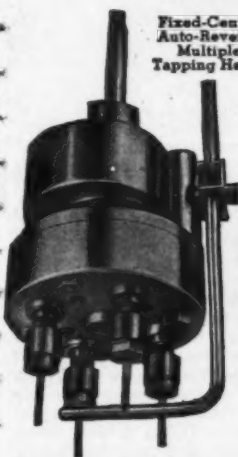
★ Write for
Bulletin A-500

ERRINGTON MECHANICAL LABORATORY

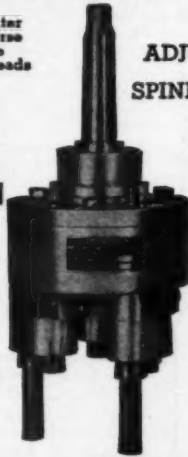
STAPLETON, STATEN ISLAND, N. Y.

MULTIPLE HEADS

Fixed-Center
Auto-Reverse
Multiple
Tapping Heads



ADJUSTABLE MULTIPLE SPINDLE DRILLING HEAD



All Parts
Fully
Enclosed
to Insure
Pressure
Lubrication
and
Rigid
Support of
Adjustable
Spindles

Super-Sensitive
Fixed-Center
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Drilling Heads



SCHAUER SPEED LATHES

. . speed Production

Faster finishing operations are performed by SCHAUER Speed Lathes . . . and more expensive machinery are relieved of this work.

Write for Catalog No. 420

"the originators of today's Speed Lathes"

Type VA3B Variable Speed Lathe — especially designed for lapping gages at extremely low speeds. Also plenty of reserve power for heavy work.

SCHAUER MACHINE COMPANY

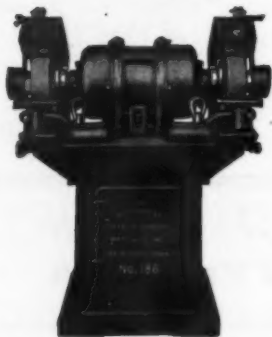
2064 READING ROAD

CINCINNATI, OHIO

BRIDGEPORT

Motor Driven Floor Grinders

ALTERNATING CURRENT
NOS. 184-186



Hardy, Rugged, throughout, from base to work rest.

Equipped with automatic starter having overload and undervoltage protection. Machine has push button control. Spindles accurately ground, and made of high carbon steel. Large sized ball bearings are mounted in heavy bell type end shields.

Write for folder
giving full details.

BRIDGEPORT SAFETY EMERY WHEEL CO.

1304 W. BROAD ST. INC. BRIDGEPORT, CONN.

Plastic Repairs Patterns

A plastic which for years has given strength and resiliency to box toes of shoes now speeds military production in foundries by affording quick, easy, economical repairs and alterations to patterns of metal castings.

A colloid treated fabric trade-marked "Celastic," this plastic is double-napped cotton flannel, similar to a cotton blanket, impregnated with cellulose nitrate and a fire retardant making it slow-burning. Wet down with a solvent, it may be formed into any shape, and will retain that shape on drying. It has good adhesive properties, and will stick to wood, metal, and other materials.

When a wooden or metal pattern is to be repaired or altered, a piece of "Celastic" is cut to the desired size and shape. The piece may be beveled to a feather edge. It is then wetted with a solvent, and easily formed into the shape of the pattern with the fingers or a shaping tool. It has a hard, even surface on drying, and may be lightly sanded and shellacked for a smooth surface.

Patterns formerly discarded but now repaired with "Celastic" have given satisfactory service for as many as 200 castings in tests at the Worthington Pump Company in New Jersey and still remained in excellent condition.

"Celastic" will dry in 25 minutes with some solvents, but longer drying periods are recommended. The plastic may be reworked or removed entirely merely by again wetting it with a solvent.

Allen Power Bench Type Punch Press

A Small punch press for small work.

Height 17½". Base 8½"x8½"
Flywheel 10" D. Wt. 28 lb.
Stroke ¾"
Capacity soft iron ¾"Dx½"
Weight 120 lb.
Power required ¼ to ½ H. P.

Price \$125.00

Circular on request.



Alva F. Allen, Clinton, Mo.



Di-Acro Brake No. 1 rapidly forms angles, channels, "Vees". Folding width 6". Brake No. 2, folding width, 12". Accurate to .001".

METAL DUPLICATING

Without Dies



Are you in a rush for some duplicated metal parts? Do you have experimental work? In many cases you can make the parts faster with the "Di-Acro" System, and avoid entirely the expense and delay of making dies. An almost unlimited variety of work can be rapidly done by the combined use of 3 Di-Acro Precision Units,—Shear, Brake, Bender.

WRITE FOR CATALOG New 32-page catalog "Metal Duplicating Without Dies" gives full details, shows many parts which can be made.

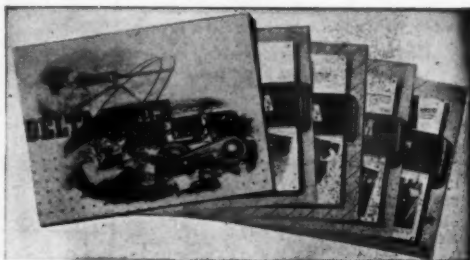
O'NEIL-IRWIN MFG. CO.

314-8th Ave. S.,

Minneapolis, Minn.

Delta Units In War Production

Many time-saving adaptations of low-cost machines to all branches of the armament program are photographically shown and described in an unusual new booklet just published by the Delta Mfg. Co., 604-H East Vienna Ave., Milwaukee, Wis. Scores of actual shop photographs show many applications of the new type low cost Drill Presses, Grinders, Cut-Off Machines, Abrasive Finishing Ma-



chines, Circular, Scroll and Band Saws. There are numerous pictures of arsenals, aircraft plants, ship yards, foundries, training schools, ammunition factories and war production plants of all types showing special set-ups developed at low-cost; batteries of drill presses operated by women and un-

skilled labor; clever short cuts made possible by these flexible, adaptable machines. Any one connected with the problems of maintaining and increasing war-time production will find it well worth while to write for a copy of this graphic and practical booklet.

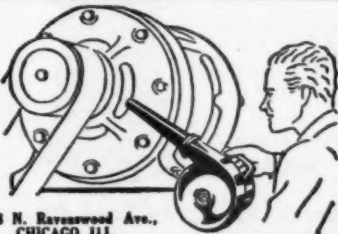
DON'T SCRAP MOTORS and Don't Scrap Scrap!

SAVE MOTORS by keeping them clean with the **TORNADO** Portable Electric Blower. Blows out dust, dirt and lint. Operates from any light socket. No dangerous condensed moisture.

SAVES SCRAP from floors, bins, etc. Pick it up with the powerful suction of the **TORNADO** Portable Industrial Vacuum Cleaner. Cleans floors, walls, line-shafting, etc. Attachments for cleaning everything.

Write for details and **FREE TRIAL Offer**

BREUER ELECTRIC MFG. CO.,



5118 N. Ravenswood Ave.,
CHICAGO, ILL.

YOST DRILL PRESS VISE



This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

Offered in two sizes.

Vise No.	Width of Jaw, inches	Open Inches	Weight Pounds
1D 2D	3½ 5	3½ 5½	12½ 23

Do you need a vise of ANY type?

Write today for bulletins on the extensive Yost line

YOST MFG. COMPANY

1335 SO. MAIN ST.
MEADVILLE, PENNSYLVANIA

BURKE

MILLING MACHINES

Make Fast Work of Small Jobs

Motor
Driven

Timken
roller or
ball bear-
ings to
spindle

Write today for
circulars.



Burke Machine Tool Co.
297 E. 16th St., Conneaut, Ohio

Speeding Spray-Gun Operations

In a profusely illustrated 15-page booklet—"How to Speed Up Your Finishing Operations," the technical staff of the Finishes Division, E. I. du Pont de Nemours & Co., Wilmington, Del., explains the 11 factors that must be properly controlled in order to attain the utmost efficiency in spray painting.

Because today manufacturers are confronted with new finishing problems as a result of conversion, and many semi-experienced spray-gun operators work on the production lines, the pocket-size booklet is expressly devised as an educational piece to help speed output, avoid rejects and wasted finishing materials.

The 11 points for efficiency and conservation described in text and illustrated by photographs and diagrams are:—Temperature of Paint; Air and Fluid Pressures; Viscosity of Paint; Adjustment of Spray Gun; Handling of Spray Gun; Triggering of the Gun; System in the Strokes; Uniformity of Coating; Thickness of Film; Causes of Rejects; Touch-Up Procedure.



"Only 30 cents for all this metal! Why, where's your patriotism?"

★
For
VICTORY
Buy
United States
War Savings
BONDS
and Stamps



Maximum Tool Life
plus Maximum Production
— Use CROBALT!

● A superior heat resisting chromium-cobalt-tungsten high speed cutting alloy. Permits higher speeds with longer tool life.

Eliminates the possibility of chipping. Combines maximum production with minimum cost per piece.

Catalog rushed on request . . .

Write Dept. E

CROBALT INC.
ANN ARBOR, MICHIGAN

ROBALT

Employees Win Awards

More than \$63,000 has been paid since January 1 to employees of the General Electric Co., as a whole for suggestions adopted to speed war production, according to General Sup't B. G. Tang.

During this period, 7500 of approximately 25,000 submitted suggestions were adopted by the Company, Mr. Tang revealed.

Among recent outstanding employee suggestions was one relating to an im-

provement in a particular type transmitter part, several of which are used in highly complex aviation equipment. This suggestion earned \$350 for its originator, Miss Laura Garrison, who instructs new employees in a G-E plant.

Another suggestion was an improvement in assembling radio equipment for the Army and Navy. This suggestion was offered by John Vos, employed in a G-E radio testing department, who was awarded \$40.



FLOATING HOLDERS for Screw Machines

**Now Available for
IMMEDIATE DELIVERY**
(In Stock)

	Our No.	
B & S No. 00	- No. 1	- \$6.00
B & S No. 0	- No. 2	- 6.25
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Made of forged Steel
as developed by our Engineers

(Designers and Builders of Fine Machine Tools)

AJAX ENGINEERING & MFG. CO.

MANUFACTURERS OF HALCO PRODUCTS

14230 BIRWOOD AVE.

DETROIT, MICH.

Making Quartz Flats

Optical flats of quartz have come into increasing preference, due to specific advantages of the latter over glass. Even should the quartz flat receive a scratch, it will not materially affect its efficiency. Scratches on quartz do not give rise to ridges, as is the case with glass. Where one scratch would probably render a glass flat useless; one of quartz can have so many scratches as to be almost opaque, and still render good service, says Industrial Diamond

Review, London.

In making quartz flats, great skill is needed. Accuracy has to be within 2 millionths of an inch! Final polishing operations are performed by hand, and are produced with an accuracy for parallelism and flatness of .00002 and .00001", respectively, with a working tolerance of .0003" allowed for thickness.

Interesting methods are applied in manufacture. Pyramidal ends are removed from the big quartz crystals by iron sawing discs, impregnated with diamond dust. Then the sawn surfaces are ground square with the optical axis of the crystal. Usually the crystals must be cut on both ends, ground and polished, to permit internal inspection for defects.

Longitudinal and transverse resawing provides the rough blocks. These are ground on both sides on horizontal grinding wheels. Then the cylindrical edge is ground to shape. Edges are not polished, specially. Polishing of flat sides consists of a series of lapping operations. The number depends on degree of finish desired. Cast-iron lapping discs with different degrees of abrasives are used in these operations. Flats are held in position by partial embedding in pitch, with upper faces clear. Each face requires about 8

Smooth as a Mirror and Perfectly Flat . . .



**It's an
"Acme Lapped"
Molding Die
Insert !**

★ The above actual photo illustrates the flatness of the surface of a steel molding die insert after it has been lapped by Acme. See how the image is reflected—not a single flaw.

Where molded parts must have a super-fine finish or a perfectly flat face, your most economical, safe-sure answer is an Acme Lapped insert. In fact, there are many instances . . . widely different in scope . . . where Acme Flat Lapping offers the quickest and best solution.

For contract flat lapping send us your requirements—no obligation !



Acme Advice is Yours for the Asking

ACME INDUSTRIAL COMPANY

Makers of Hardened and Ground Precision Parts

210 N. Laflin St.

Chicago, Ill.

MONroe 4122

Clamps Any Kind of Material Without Distortion

Here's a production vise that can be used as safely with soft metals as with hard—because its jaw pressure is adjustable so as to clamp the work without distortion.

Even though the parts that are being clamped may vary in thickness, the jaw pressure is always the same—never any harder on an oversize part than on a regular size part.

In both milling and drilling operations, the Presto-Vise speeds up production tremendously because a single movement of the lever causes the sliding jaw to travel from "open" to "closed", or vice versa. And the $4\frac{1}{2}$ " opening between the jaws makes it easy to get the work quickly in and out of the vise. Ideal also for use as a drill jig.



Free
CATALOG

D. A. SMITH & CO.

8087 Livernois

Detroit, Mich.

PRESTO-VISE

MADE OF ALLOY STEEL MILLED FROM BAR

SOCKET HEAD
CAP SCREWS



SAFETY HOLLOW
SET SCREWS

Try Them On Your Next Job!

**ECONOMY
MACHINE PRODUCTS
COMPANY**

5207 Lawrence Ave.,

Chicago, Ill.

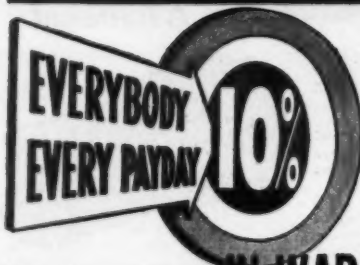
hours of lapping. When reversed on its table, this already-finished surface serves as datum for determining thickness and parallelism, to the 2-millionth inch accuracy previously mentioned.

Accurate control of thickness is not always obtained on the machines, requiring hand-finishing, a highly skilled process. In this operation, an accurately flat steel disc is warmed and moved by hand over the stationary pitch table. The steel discs are trued themselves on the lapping machines used for the flats. Treated pitch surfaces are trued at frequent intervals with a smooth and level steel disc.

In employing the flats in checking micrometers and for other purposes, the principle of Newton's rings is used. Each interference-band indicates an air space between the contacting surfaces of thickness equal to $\frac{1}{2}$ a wave-length of light, i.e., of the order of .00001".

**Buy U. S. War Savings
Bonds and Stamps**

Wanted: A Billion Dollars a Month!



America needs *your* help in encouraging employees to set aside 10% of your gross pay roll for War Bond purchases. For details of the Pay-Roll Savings Plan, approved by organized labor, write Treasury Department, Section U, 709 Twelfth St. NW., Washington, D. C.

IN WAR SAVINGS BONDS!



This space is a contribution to America's All-Out War Effort by

HITCHCOCK PUBLISHING CO.
508 So. Dearborn St.,

Chicago, Ill.

Air Tools

Air turbine tools are popular and the application of the air turbines to some types of rotary tools is very important. For this is the one kind of air tool that may be run safely without load, depending upon the propulsive force of compressed air against rotor blades to obtain the necessary rotary motion. Very high speeds may be obtained in this way, and many machine designers who have used air turbines declare them to be superior to anything else for certain applications.

In general, the air turbine is chiefly applied to small hoists, and to high-speed drills and grinders. However, it is very interesting to note that it has found considerable application to high speed wood-working machinery which takes only a light cut at the spindle, such as light-duty high-speed wood shapers and routers.

Users of air turbine motors generally design and build their own for the products to which they are applied. Size of the turbine rotor, and the pressure of the compressed air used, are the 2 factors which determine speed. One can adjust speed without regard to the first, simply by lowering pressure or by decreasing amount of air thru a valve, but when this is done,

power of the motor is decreased in proportion.

As for lubrication of rotors, bearings of air turbine motors are often oiled by hand, but if there are enclosed gears involved in a mechanism to which it is applied, they are of course bath-oiled for best results.

Use of air turbine driven tools has received great impetus in the war-production speed-up, with hardly a shop, where several of these efficiency aids cannot be found.

DOUGLAS

PLAIN MILLER

FOR SMALL PARTS PRODUCTION

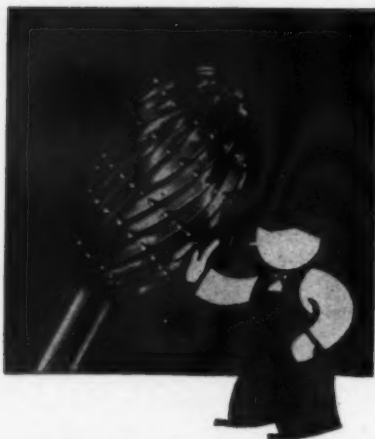


WIDE RANGE OF
SPINDLE SPEEDS from
75 to 1200 R.P.M.

TABLE SIZE
32" x 8"

QUICK DELIVERY
BY LARGE SCALE PRODUCTION

DOUGLAS MACHINERY CO. INC.
150 BROADWAY NEW YORK, N. Y.



SHARP TOOLS CUT COSTS!

OUR REGRINDING SERVICE
KEEPS YOUR ROTARY CUTTERS
IN TOP-NOTCH CONDITION

To get real production on the finishing of metal castings, dies or patterns you can't beat the new Yeomans Rotary Cutters. Now available in a wide variety of standard and special shapes and sizes to fit the needs of any job. Yeomans Rotary Cutters are ground from the solid after hardening to 60-65 Rockwell. They take clean sharp bites at high or low speeds. And with Yeomans regrounding service you can keep them in top-notch shape almost indefinitely. And if you're helping America's Arms Program, you can help even more by speeding up your finishing operations on dies, castings and patterns with tough, hard-biting, sharp-toothed Yeomans Rotary Cutters. Write to:

Yeomans
7001 CO - 2705 Bay St., Saginaw, Mich.

Hammond 20-S Wet Grinder



A newly designed 20" Wet Tool Grinder is announced by Hammond Machinery Builders, Inc., 1614 Douglas Avenue, Kalamazoo, Mich.

Known as the 20-S, it is said to incorporate in its heavy, streamlined construction all the latest improvements for grinding of all hard metals, alloys and tungsten carbide.

The standard machine illustrated features a new, improved tool rest and wheel dresser. Tool rest is adjustable to any desired angle and has replaceable steel wearing plate. Wheel dresser, an integral part of the assembly, affords an easy method of dressing face of grinding wheel. The entire unit adjusts in and out from wheel by means of a detachable hand crank, which actuates a protected screw mechanism. Circulating coolant system with convenient regulating valve located in sludge pan to the right of tool rest, provides regulation of coolant flow. The detachable splash guard (as shown in phantom across front of the newly

designed sludge pan) provides added protection to the operator.

The 3 hp totally enclosed fan-cooled motor is located in the base with a push-button starter high at side of machine. Starter is of the magnetic type with overload, low voltage and phase failure protection.

Grinding wheel furnished is 20" in diameter x 2½" face with a 9" hole for mounting on a large hole wheel flange. The heavy cast wheel hood has hinged cover. Removing 2 Allen cap screws, the hinged cover swings out of the way giving accessibility to the wheel. Wheel is dismounted by mere removal of a nut and 4 Allen cap screws.

For a heavy duty, high production carbide tool grinding, the modern design of the 20-S permits use of an 8"x8" table with tilting mechanism (optional equipment). The table tilts on hardened pivot pins with oilite bronze bushings by merely flipping convenient locking levers on sides. The entire table assembly moves in and out from grinding wheel face by means of a detachable hand crank actuating a protected screw mechanism.

Bulletin No. GP-101 gives complete information.

Standard Seam Welder Bulletin

Technical and descriptive Bulletin 801-B . . . covering its new line of standardized Seam Welders, has been released by Progressive Welder Co., 3050 E. Outer Drive, Detroit, Mich. The bulletin covers design and operating features of light, medium, and heavy duty seam welders which are available in 3 styles—for transverse welding; for longitudinal welding, and for both types (Universal models).

Diagrams of the 3 types of drives available for these machines, as well as illustrations of typical applications are included. Specifications tables and drawings showing major dimensions of the standardized machines are provided.



UNIVERSAL FIRST COMPANY IN AMERICA TO WIN COV- ETED 20% BOND FLAG

When each of the 550 of us here at Universal helped give the Allied cause a boost by being America's first industrial plant to subscribe 20% for War Bonds we were mighty proud.

But we're even more proud of the big volume of precision built drill bushings we're turning out daily to help America's arms production.

Universal drill bushings (such as the one shown here) are straight and round with superfinished bores which assure accuracy and unexcelled wearing qualities. Write for facts.



UNIVERSAL
ENGINEERING COMPANY
FRANKENMUTH, MICH.

Elmes Hydraulic Pump



Illustration shows a 6-plunger, fully enclosed, horizontal, hydraulic pump—an addition to a broad line manufactured by the Charles F. Elmes Engineering Works, 244 N. Morgan St., Chicago.

The pump is modern in appearance and embodies the latest principals of design and construction. Moving parts are pressure lubricated and the connecting rods run in a continuous bath of oil. Roller bearings are used thru-out.

TAG-O-GRAPH Tag and Label Addresser



Address 60 shipping tags or labels in one minute.—Insure against mistakes or lost packages. So simple—anyone can use it, yet as effective as machines costing 10 times as much.

Send for complete description and prices.

Weber Addressing Machine Co.
537 S. Dearborn St., Chicago, Ill.

Maximum capacity is 400 hp. Herringbone Gears, running in continuous bath of oil, are used for driving the pump, insuring long gear life. Compact arrangement of the pump is a space saver, and it is particularly adaptable for accumulator systems.

Can be equipped with built-in bypass valves or safety valves, as desired. Complete data is available from the firm.

ALL ALLOY PORTABLE SHEARS

FULLY
GUARANTEED



No. 1 cuts up to No. 11 gauge strip or sheet.
No. 2 cuts up to $\frac{1}{4}$ " steel plate.

Special Blades for shearing stainless steel.

BREMIL MFG. CO.
1720 Pittsburgh Ave., Erie, Pa.

LIKE A DUCK TO WATER



WOMEN and unskilled operators take to these machines

And here's the proof: Reports from shop superintendents and managers in plants (names on request) using Delta Drill Presses, Grinders, Saws and Cut-Off Machines read: "... unskilled operators can be used successfully due to the accuracy and perfect balance of Delta machines." "... with Standard Delta Drill Presses we have built a special machine that enables us to use unskilled labor on an extremely difficult operation—thus freeing skilled mechanics for more difficult work." "... the training time and breaking in period have been considerably reduced with Delta machines thus permitting us to take better advantage of unskilled labor."



Delta Design Always Offers These Advantages:

Low First Cost • Low Maintenance Cost • Economical Operations • Reduced Labor Costs • Greater Flexibility • Portability
The complete DELTA-Milwaukee line consists of low-cost, high-quality Drill Presses, Cut-Off Machines, Grinders, Abrasive Finishing Machines, Saws, Lathes, Jointers and Shapers.

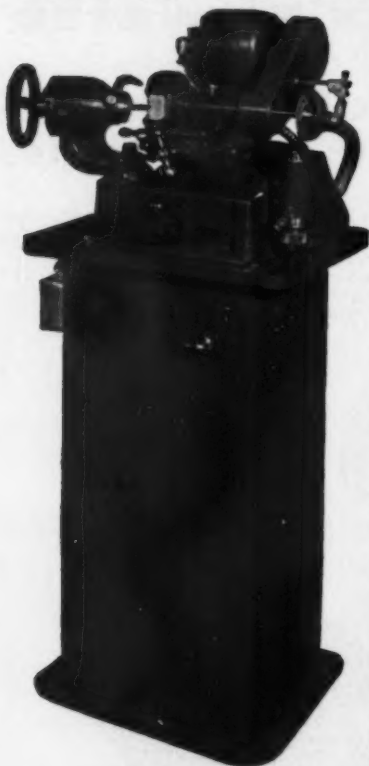
SEND FOR FREE "TOOLING TIPS"

showing how other manufacturers are taking advantage of DELTA machines. Get in touch with the nearest DELTA Industrial Distributor or write direct to The Delta Mfg. Co., 604-L E. Vienna Ave., Milwaukee, Wis.



**DELTA
MILWAUKEE**

HYBCO TAP GRINDERS



For Sharpening
CHAMFER - FLUTES - SPIRAL POINTS

CAPACITIES:

Machine Screws to 1½" hand taps.

Can be arranged for any number of flutes—right or left hand.

ALL TAPS HELD BY SHANK.

Can be sharpened after center is destroyed.

Write for catalog—and send us your problem.

HENRY P. BOGGIS & CO.
1279 W. 3rd St. Cleveland, Ohio

WE INVITE YOU TO TRY

CRATEX

WHEELS AND POINTS

The World's Best Rubberized abrasives for Fine Grinding and Polishing

Attach this advertisement to your card or letterhead. We will send you a free trial sample. Or if you prefer send \$1.00 for Special 33 wheel assortment.

CRATEX MFG. CO., 81 Natoma St., San Francisco, Calif.

Colborne Speed Lathe

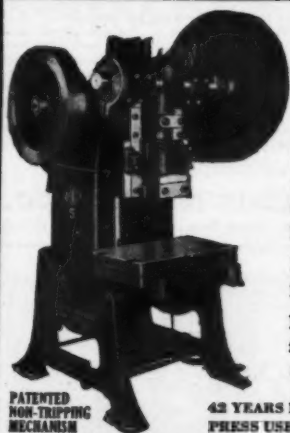
These days find many needs for speeding up final operations on dies, screws, shafts and long rods. Built to meet these needs, embodying experience of nearly ¾ of a century of machine manufacture, this speed lathe, by Colborne Mfg. Co., 157 W. Division St., Chicago, is claimed to afford the smooth-running, heavy, quality construction demanded in such a production adjunct.



It is designed for efficient, economical lapping in miscellaneous finishing operations, with collets or chuck, and powered by 1 hp built-in motor with variable speed control, using Reeves standard pulley and belt.

Smooth, automatic brake acts instantly when switch is thrown.

The firm has printed literature available, giving full details to interested plant executives.



PATENTED
NON-TRIPPING
MECHANISM

UNLIMITED PEAK PRODUCTION

Much larger die space than average presses. Engineered and designed for unlimited peak production.

Reinforced construction at points of greatest wear.

If you want the best, send for illustrated catalog describing complete line TODAY.

With Modern



42 YEARS ENGINEERING EXPERIENCE BUILT INTO EVERY JOHNSON PRESS USED BY LEADING MFR'S. THROUGHOUT THE WORLD.

JOHNSON MACHINE AND PRESS CORP., ELKHART, INDIANA



FlexoID Speed Control units
*are helping to STEP UP
production of MACHINE TOOLS*

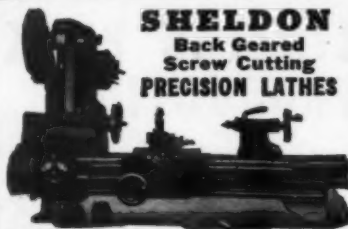
- 3** STANDARD 4 SPEED UNITS
STANDARD SPEED RANGES
1 TO 16 NONSPARE
4 Speed Ratios 1/2, 1, 2, 4
8 Speed Ratios 1/4, 1/2, 1, 2, 4, 8

MANUFACTURERS of machine tools who are already successfully incorporating these sturdy ready-made gear boxes into their products, are enabled to divert critical labor and materials to other channels, thereby increasing their output, so necessary to win the war.

Our engineers are ready and anxious to demonstrate to all makers of SHAPERS, PLANERS, MILLERS, BORING MILLS, etc., the efficiency and surprising economy of FlexoID Speed Control Units.

Correspondence **PST** is invited

1545 E. 23rd St., **THE Smith POWER TRANSMISSION CO.** Cleveland, Ohio



SHELDON Back Geared Screw Cutting PRECISION LATHES

A complete line of full sized, full weight 10", 11" and 12" Precision Lathes... bench, floor and pedestal types built to industrial machine tool standards and specifications. Rigid heavily braced, semi-steel beds with hand scraped ways — 2 "V" — ways and 2 Flat Ways. Large hardened steel spindles, ground all over and individually fitted into hand scraped bearings. Each lathe has a full complement of attachments and accessories. Each model gives more lathe per dollar.

See the **SHELDON** before you buy.

SHELDON MACHINE CO.

4242 No. Knox Ave.,

Chicago, U.S.A.

Portman 20" Screen Optical Comparator

Portman Machine Tool Co., Beechwood and Hillside Ave., Mount Vernon, N. Y., announces a new larger sized Optical Comparator.

Known as the Portman Model P222, it offers several features not heretofore regularly obtained in equipment of this kind. The large 20" diameter image screen makes it possible for this comparator to project an unusually large area.

The fine quality lens units furnished are said to provide a sharply defined outline of the part over the entire 20" diameter screen area. Equipment includes a co-ordinate type stage, dial indicators for taking continuous readings, surface illuminators for projecting the surface characteristics of a part, and a blower system attached to the light source assembly enclosing the condenser lens unit. In addition, the light beam is filtered thru a colored heat absorbing glass unit within the condenser lens, providing a soft light



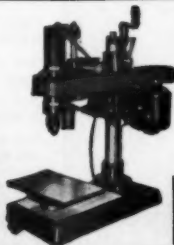
of great clarity over the entire screen. The comparator can be furnished

Small Drills

are too precious to
abuse or wear out.

Save them... Use Instead

The **HAMILTON
MUEHLMATT**
Super Sensitive
DRILLING MACHINE



Precision-built for finest work.
For holes from .004 to 5/16 dia.
For production or research, singly
or arranged in multiples.

Write Dept. B-10
for bulletins.

THE HAMILTON TOOL CO.
Ninth and Hanover Streets.
HAMILTON OHIO

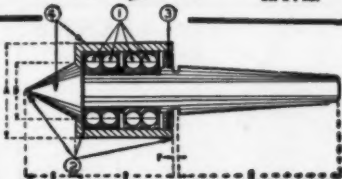
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5 REASONS Why They Meet Every Specification:

1. FOUR (4) ROWS of precision BEC-4 specification bearings.
2. Note SHORT OVERHANG assuring rigidity and accuracy—eliminates "chatter"
3. Positive FELT-SEAL—excludes dirt—retains lubrication.
4. HARDENED AND GROUND CONE—point accurate to within .0002.

5. HEAVY
DUTY—Note
Combined Ra-
dial Thrust
Load at 100
R. P. M.

Shank Type No.	A	B	C	D	E	Combined Radial-Thrust Load At 100 R.P.M.	Net Price
2	1N	3/4	3/4	1 1/4	3/4	1600	\$23.00
3	1N	3/4	3/4	1 1/4	3/4	3300	\$25.00
4	2 1/4	1 1/4	1 1/4	1 1/4	4 1/4	7500	\$35.00
5	2 1/4	1 1/4	1	2 1/4	5 1/4	12000	\$47.00



All orders must be accompanied by extendable priority

FISHER TOOL CO. 226 LAFAYETTE STREET
NEW YORK CITY



*Shear Cut—
High Speed*

END MILLS

Shear Cut End Mills
are offered in all
standard sizes, single
and double end.

*Write for catalog
and prices today.*

PROGRESSIVE TOOL & CUTTER CO.
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LESLIE HAND PUNCH PRESS
MOST CAPACITY
 POSITIVE ALIGNMENT



Steel, cap. 4" dia. nose thru 10 ga. iron, proper shear on punch, throat depth 6". Takes punch presses up to 3"x4" in area. Leaf arm gives perfect alignment without ways or leader pins. Portable. Ask your dealer, or write for circular.

LESLIE WELDING CO.
 2947 Carroll Ave. Chicago

The GLENNY
 Adjustable-Expansion
BROACH



Produces low cost, accurate keyways. Eliminates set-up time. Self aligning. Interchangeable parts. Adapted for arbor press, mechanical or hydraulic pressure. Speeds up production. Cutter bars in carbon or high speed steel. Details? Write!

EAST SHORE MACHINE PRODUCTS CO.
 833 E. 140th St., Cleveland, O.

DIAMONDS for Victory



BIG-HEAD-NIBS
LOC-KEY-SET
RE-SET-ABLE

Grinders instruction card free.

Cooler dressing
 Closer tolerances
 Micrometer accuracy
 Because: Wing key
 heat dissipation
 and absolute diamond
 lock nibs.

Three grades of diamonds. Common quality \$12 per karat. Medium quality \$24 per karat. Select quality \$48 per karat. (Contour template diamonds supplied only in Medium and Select quality.)

All diamond sizes 1/4 to 10 karat are nib mounted for immediate shipment... Billed subject to approval. Specify quality of diamond wanted. We recommend a minimum size of one karat for each 6" diameter of grinding wheel. (24 hour resetting service, \$1.00 post paid.)

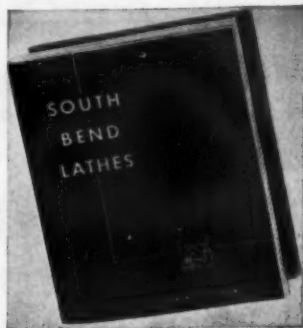
Send specifications and prints for prices on turning and boring form tools.

DIAMOND TOOL COMPANY, Not Inc.
 Sheldon M. Booth, Pres.
 935 E. 81st Street CHICAGO, ILL.

with lens units of the following magnifications: — 10X, 20X, 30X, 31 1/4X, 45X, 50X, 60X, 62 1/2X, 80V, and 100V. 45V, 50V, 60X, 62 1/2X, 80X and 100X. The principal dimensions are:—Height 58"; width 28"; depth 36", and the weight is approximately 400 pounds. The light source will operate on 110 to 120 volts, a-c or d-c. Critical inspection and comparison can be made on this instrument, even in the hands of inexperienced operators.

South Bend Catalog

A new catalog describing the entire line of South Bend Engine Lathes, Toolroom Lathes, and Turret Lathes Catalog 100 has just been published by the company. Engine Lathes and Toolroom Lathes are made in 3 sizes, having 9, 10 and 16" swings. The new catalog has 48 pages, 8 1/2" x 11", and can conveniently be filed in letter size catalog files.



Each size and type of lathe is illustrated and fully described, with specifications tabulated to facilitate selection of the lathe required for any desired application. Attachments, tools, and accessories for adapting these lathes to special classes of work are also illustrated and described.

Catalog No. 100-B can be obtained from the South Bend Lathe Works, Dept. M6, South Bend, Ind.

Shapers

When you have a shaper with a really good universal table, you have a highly versatile machine, and one that by the same token is highly useful. One of the weaknesses of some universal tables has been their lack of rigidity, but machine designers are getting to the point where much of this trouble has been eliminated. In the case of one highly efficient shaper having a universal table, the table mounting revolves laterally around a large trunnion which has been cast integrally with the apron. Once it has been properly positioned and tightened into place, this gives one of the most rigid layouts possible. Table is fitted with top that rocks in direction at right angles to pivoting action on trunnion, and rocking mechanism is so arranged that table top keeps a solid bearing in table body, regardless of position at which placed.

Many shapers which had formerly given questionable production have been brought up to par by the simple expedient of applying a good motor drive. This is especially true where an old machine in reasonably good condition has been fitted out with mod-

THESE ARE THE PUMPS with inbuilt reliability to help your machines in round-the-clock service

Gear-Vane-Centrifugal - a wide range
of sizes for various applications.



Brown & Sharpe Mfg. Co.
Providence, R. I., U. S. A.



BROWN & SHARPE PUMPS

ern carbide tooling, and in consequence demands a higher operating speed in order to give proper results from that tooling. If you install a really efficient motor drive on such a machine, it can be arranged at speed which will produce best results from the better tools. It is, of course, in order to go over such a machine and take out any unnecessary lost motion or other operating defects that may be discovered.

Saran Plastic Pipe



A new plastic pipe, manufactured in the same dimensions as extra strong steel pipe of 2" OD or less, is announced by The Dow Chemical Co.

Resistance of this pipe to extreme moisture, chemicals and solvents, coupled with its strength and fatigue life, indicate it will play a vital role in industry. It is entirely unaffected by water—and only a few solvents ex-

hibit any adverse effects. In many applications it will undoubtedly replace strategic materials, such as vital metals and rubber.

It is made of a new thermo-plastic resin known as Saran. The base resin is odorless, tasteless and nontoxic. The plastic does not burn and its toughness and abrasion resistance are of a high order. Retention of these properties on aging insures excellent wearing qualities. It is nonscaling and withstands freezing. Heat resistance is said to be excellent up to 175 F.

Saran pipe is produced in smooth, round, accurately sized lengths having dimensions identical with those of strong iron pipe. It can be readily welded, heated and bent. In welding, pieces are placed on a hot plate heated to 350-400 F and held until molten material appears. Pieces are then placed together in proper position, pressed firmly and allowed to cool for 10 seconds, as shown in illustration. Resultant weld has greater joint strength than the pipe itself. Can be cut with

GROBET ROTARY FILES

ground from the solid



Ask for Catalog WG

the most complete catalog of its kind, illustrating hundreds of rotary files hand cut, milled cut, ground from the solid; also diesinkers' burs.

GROBET FILE CO. of AMERICA

**3 PARK PLACE
NEW YORK CITY**

a wood or hack saw and threaded with ordinary iron pipe dies.

In demonstrating threading of larger plastic pipe sizes, Dow engineers advise inserting a close fitting plug within the end to be threaded to guard against compression of the pipe and resultant shallow threads. This precaution is not absolutely essential providing sharp dies are used.

Weight of the pipe is naturally much less than comparable sizes of iron pipe. This, too, is a decided advantage in shipping, general handling and suspension. Tabular data concerning sizes, weights and bursting pressures is available.

Fittings, except standard flanges, are not available at the present time altho they are expected to follow shortly. Molds are now being constructed to make additional flanges, with threaded ends, tees, and couplings to be available in the near future.

Halco "Flexible" Milling Head

The Ajax Engineering & Mfg. Co., 14230 Birwood, Detroit, Michigan, who have recently taken over manufacture also of the Halco Universal Head, report that they have made several engineering changes on their product. The gearing mechanism has been changed, and whereas in the past it was made on a production basis only, from now on it will be a precision tool device. Due to these changes, longer life, greater speed, accuracy and dependability are said to be assured. Manufacturing facilities have been tripled and deliveries are almost immediate.

The Halco Milling Head has proven its importance in building tools, dies, jigs, fixtures, wood and metal patterns and other machine products. Its 4" vertical travel permits many milling, boring and facing operations in one setup.

**5000
Shapes and Sizes
Grobet Swiss Files**



Write for Catalog WF

The most complete catalog of its kind. Lists 5000 different shapes, sizes and cuts of GROBET Precision Swiss files.

Learn more about these chrome Steel Files that have won a reputation for utmost precision and durability.

Ask also for catalog WM on Files for Filing Machines; catalog WR on Rotary Files and Diesinkers' Burs.

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STOP



BURN-THROUGH AND WARPING

on short-time welds with
Westinghouse
SYNCHRONOUS TIMERS



Random (nonsynchronous) switching of resistance welding current causes as much as 50% variation in the heat produced in short-time welds.

Westinghouse Synchronous Timers deliver uniform heat—prevent unpredictable “transients” which produce many burned, warped or cold welds. They start and stop weld current on the zero point of the wave. Since wave form is identical, all welds are identical in strength and soundness.

Synchronous Timers are essential to uniform production welding of critical alloys and thin materials. They are available for spot, seam, or pulsation welding. Ask your Westinghouse representative for full data. Or write Westinghouse Electric & Mfg. Co., Dept. 7-N, E Pittsburgh, Pa. J-21191

Westinghouse

RESISTANCE WELDING CONTROL

Million-Volt X-Rays

More than 40 portable, million-volt x-ray units are now in operation or soon to be placed in service in industrial plants making important war material, such as turbines, airplane crankshafts, etc., W. F. Westendorp, of the X-ray division General Electric Research Laboratory, told the American Society for Testing Materials, recently. His paper was prepared jointly with Dr. E. E. Charlton, head of the division.

A year ago, said Westendorp, only one such unit was in use, the several

elaborate and fixed million-volt X-ray outfits had been placed in hospitals for cancer therapy. Equipment is used for radiographing parts made of steel and other metals, ranging from $\frac{1}{4}$ to 8" in thickness. X-ray pictures, made with exposures of only a few minutes, clearly reveal hidden defects, which may then be chipped out and repaired. Without such examination, defects could not be detected.

Since some of the largest castings examined weigh many tons, and are in wide variety of irregular shapes, he said, it would be extremely difficult to position them easily and rapidly for radiography with a fixed installation such as the hospital unit. Consequently the portable unit, completely enclosed in a metal tank 3' in diam, 4' in length and weighing 1500 lbs was developed.

In a plant already equipped for moving large steel castings, this can be handled easily, and moved rapidly into the most convenient position for the best result.

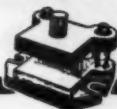
Three factors, he said, made possible such a compact and light-weight unit. These were the multi-section X-ray tube, the new “resonance” transformer, and the use of gas for insulation.

X-rays result when electrons are hurled against a metal target, and they are more penetrating the faster the electrons are made to move.

INTERCHANGEABLE BECAUSE

- Precision bored on master plates
- Precision assembled with cylinder squares

DANNEMAN *Precision* DIE-SETS



DANNEMAN DIE-SET COMPANY

702 LAFFETTE ST. NEW YORK, N. Y.

Soldiers of Industry

We are all in this fight to win—and we can all help by **SAVING** Ten Minutes a Day with greater care and more production:

Gaining 10,000,000 Workers
Save 10 Minutes a Day
Save 100,000,000 Minutes
Or 1,666,666 Man-hours a Day

Increased
Production to
Speed Up Our
Victory!

Imagine what this will mean to our fighting forces and our government—more fighting equipment, more air craft, tanks, guns, tractors, ships and munitions to over-power the enemy!

Your company is behind you and your government is behind you. Let every one of us back up our fighting men like real Soldiers of Industry, with extra effort equal to the saving of 10 Minutes Every Working Day.

Posters, 8½ x 11" carrying this con-

structive wartime suggestion are available without charge from the Bound Brook Oil-Less Bearing Co., Bound Brook, N. J. Order some for your shop bulletin boards.

Offers Diamond "Know-How"

Desiring to aid the war effort and further free dissemination of "Know How," Oscar Caplan & Sons, 207 W. Saratoga St., Baltimore, since 1905 makers and purveyors of diamond-set tools, bort carbons, rough diamonds and diamond powders, has placed its research and experimental facilities at disposal of plants and executive personnel having special problems or ideas involving use of industrial diamonds.

Anyone with an industrial diamond problem or idea, says Oscar Caplan, head of the firm, may call upon the facilities and experience of the company, which will be glad to cooperate in research, experimental or development operations seeking to solve such special problems.

Should you be interested, you are invited to communicate with the firm.

Red "E" DEMAGNETIZERS & ETCHERS FOR SPEED AND ECONOMY

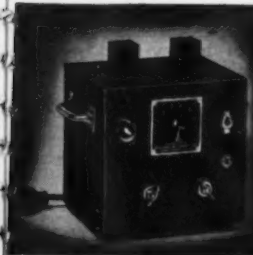
A sturdy all around unit for any shop. Demagnetizes by throwing lower switch and passing work over magnetic poles at top of unit. Etching is controlled at upper switch with convenient six station selector to adjust depth of etch.

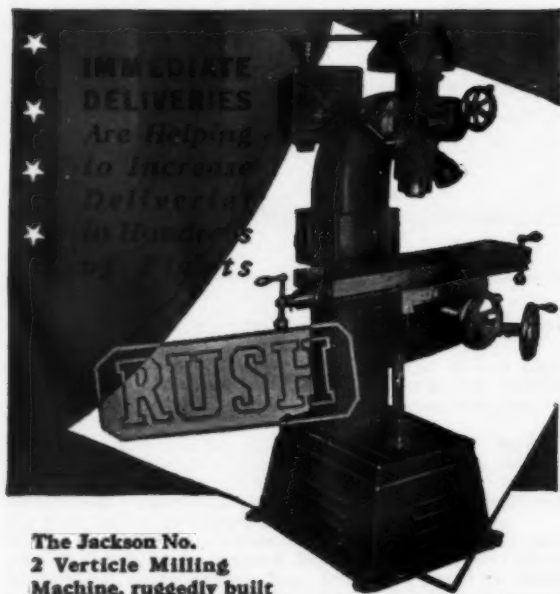
Red indicator light signals when unit is in operation. Rubber extension cord, plug, special alloy etching stylus with self cooling holder are included. Write for folder giving details.

GRINDING MACHINE CO.

2812 E. GRAND BLVD.

DETROIT, MICH.





The Jackson No. 2 Vertical Milling Machine, ruggedly built of quality materials, will prove indispensable for Tool Room or Production applications. 5 speed V-belt drive, sturdy $4\frac{1}{4}$ " quill and $\frac{3}{4}$ " spindle capacity 8' x 32" table.

JACKSON

MACHINE & TOOL COMPANY SALES DIVISION
956 Roberts St. Jackson, Michigan

Serving Assemblers

While the idea of conveyor or straight-line assembly is a splendid one on many items of relatively large size, there are still many uses for the assembler's bench. A variant of the assemble-on-the-conveyor idea is to have a battery of assemblers with a conveyor to serve the benches all along the line. It is possible in many cases, by using shunt bars in connection with a conveyor, to serve assemblers' benches at right angles to the conveyor. There are different ways in which this idea may be used to ex-

cellent advantage.

Very often there are parts by assemblers, used continually which may be stored to advantage in overhead hoppers, and drawn upon by pulling a latch string, or depressing a small trip plate. A considerable number of such hoppers may be arranged over a single assembly bench if and when there are a number of parts that may be stored in this way. Assembly operations are thus considerably simplified.

In the case of small unit assembly, small drills, tapping machines, screwdrivers and nut runners may well be a part of the equipment, either placed on or overhanging the assembler's bench. It is often the case that such very light machining operations may be performed

by the assembler at the same handling of the stock with which the actual assembling is done, and that represents an advantage. Incidentally, the modern type of hollow-head machine screws are much more convenient for the assembler, and should be favored as much as possible.

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Bonds and Stamps



DUBLIFE
PLUG GAGES LAST TWICE AS LONG
AS ORDINARY GAGES

"UPPCO FINISH"
ASSURES EXTREME HARDNESS
AND ACCURACY



ORIGINATORS
and exclusive manu-
factures of **DUBLIFE**
GAGES and **UPPCO**
FINISH

The handle is made of hexagon material with bronze tapered collet which locks around the plug as it is driven into the handle. The plugs are reversible, so that when one end is worn out the other end may be used, thus giving double life. 30,000 gages in stock ranging from .030" to 1".

Catalog showing DUBLIFE and other gages of American Gage design will be sent on request.

UNITED PRECISION PRODUCTS CO.

4618 W. HURON ST.,

CHICAGO, ILL.

Details Alco Tool Holders

With full engineering data on its line of Drill Chucks, Tap Holders, Button and Acorn Type Die Holders, Hollow Mill Holders, Etc., new catalog No. 3, Alco Tool Co., 835 Housatonic Ave., Bridgeport, Conn., shows how these 4 types of holders can be efficiently applied to every tapping, drilling, reaming and threadcutting operation.

In obviating need of bushings on drill chucks and tap holders, the firm points

the way to production and economy aids which, it claims, merit attention of every operating executive. Claimed, also, for its button type die holders is adjustable concentric alignment feature, saving setup time and eliminating difficulties in getting proper concentricity when using button dies.

The book is very detailed thruout its 20 pages and should find favor with those concerned with stepping up efficiency and economy in production.

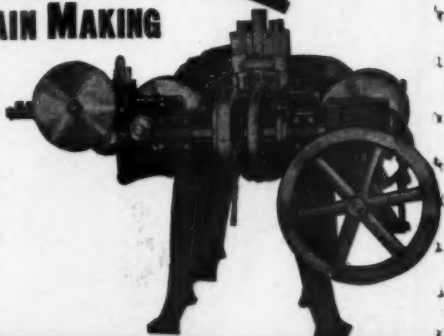
STRONG STANDARD SIZE CHAINS

WITH THE NILSON CHAIN MAKING MACHINE

To make a full line of standard size chains as known to the trade, Nilson makes the four necessary sizes of machines. Chains produced by these machines are strong, durable, safe and flexible.

20% increase in strength due to the fact that the ends are tucked in, leaving them perfectly smooth on both sides, enabling one to run them through the hands without injury. They will run accurately on sprockets for conveyors or power transmission purposes.

Let us send you complete details.



The **A. H. NILSON** *Machine Co.*
BRIDGEPORT, CONN., U.S.A.

Amic Comparator



A new type Comparator of high precision for convenient and accurate checking of large and small lots has been developed by American Measuring Instruments Corp., 40 West 22nd St., New York City.

The instrument is mounted on a heavy accurately machined square cast-iron base, into which is built a parallel ground and lapped table. This table has vertical micrometer adjustment for quick and accurate setting of the Comparator to zero position by means of a Master gauge or Johanson Block.

The magnification is 1:1000. A .001" displacement of the measuring pin causes the hand to move one full inch on the dial of 6" in length. Each inch on the dial is subdivided into 10 lines, each division indicating .0001". Deviations as small as .00002" can be detected with ease. Total capacity is plus or minus .003".

A novel feature is a disk mounted on the axis of the indicator hand rotating in a permanent magnetic field which brings the hand to immediate rest.



SAVE ON BACK WORK WITH THE NILSON TILTING WIRE REEL

Save back work and all useless motion with the Nilson Tilting Wire Reel.

A foot lever is tripped, the guards removed, a coil of wire slid upon the carrier, the guards replaced and set screws tightened, an easy lift, and the counter-balancing weight does the rest, bringing the tilting section to an upright position, ready to feed the wire into the machine. Simple in operation, and may possibly save your men from sprains, resulting in lost time and production.

Send for bulletin No. 51 and learn how to save in other ways too.

The **A. H. NILSON** *Machine Co.*
BRIDGEPORT, CONN., U.S.A.

A lever on outside of the housing permits lifting of the measuring pin before insertion of the piece to be measured, eliminating shocks to the mechanism and wear of the contact pin.

For additional convenience in final setting, a zero adjustment of the dial is provided. Two limit hands in form of sliders allow indicating the range of tolerance required.

The Comparator has a working height capacity up to 12", a throat depth of 4" and a working circle by swiveling the head of 10". For special applications, a number of backstops and accessories suitable for special components can be delivered in addition to the standard equipment.

Electronic Control for Resistance Welding

A new 38-page illustrated booklet is available, giving a simplified explanation of electronic control for resistance welding, pointing out the different kinds of resistance welding that can be done, the function of the various controls and the degree of accuracy

made possible by electronic control.

The various types of electronic control for resistance welding are illustrated and described. The booklet also explains what it is, what it does, and where and how it is applied. Also included in the same publication are 3 pages of application data on the choice and application of a-c single phase resistance welding control; an 8-page bulletin on fundamental electronic circuits; and a discussion of the cathode ray oscilloscope and its application to welding timers.

The heart of all these resistance welding controls is the ignitron tube. Development of this tube answered the long standing problem of satisfactorily interrupting high currents at speeds of 600 operations per minute and above. Its extreme precision and dependability make possible increased production of stronger, more uniform welds of aluminum and other critical alloys.

A copy of booklet B-3102 "Electronic Control for Resistance Welding" may be obtained from any Westinghouse District Office.

BUY THEM

For metal cutting results that satisfy. There is a LENOX Distributor near you.

AMERICAN SAW & MFG. CO.
SPRINGFIELD, MASS



"The Blade in the Plaid Box"

The Well-Dressed Welder

To protect welders against painful and dangerous exposure, American Optical Co., Southbridge, Mass., announces a completely new and wide assortment of high-grade welders' safety clothing that will keep hot sparks away from skin and normal work clothes.

A catalog, picturing and describing each of the garments, is available. An authoritative treatise on chrome tanned leather clothing for welders, this catalog is particularly valuable because it informs the welder as to the type of protective clothing he needs on any particular job.

Listed in the catalog are overalls, all-leather pants, hot weather pants, chaps, split leg apron, one piece apron, coat, cape sleeves and bib, short jacket, welders' sleeve, spats, gloves and mittens, sleevelets, and various complete protection combinations. A section of the catalog is devoted to hints on how to break in the safety clothing to get maximum service and wear.



WET GRINDING FINISHES CAN BE IMPROVED

GRIND-ALL is the answer to your problem.

A CONCENTRATE uses One Quart to 30 Gallons your regular grinding solution. Immediately miscible with all solutions in use.

A SURPRISING IMPROVEMENT IN DEGREE OF FINISH. Less shut-downs for wheel dressing.

Try your Mill or Industrial Supply jobber first, if unavailable thru them, send your order to

STADOIL MANUFACTURING COMPANY

617 S. Beacon, Dallas, Texas — 3221 S. Figueroa St., Los Angeles, Calif

new!

PLASTIC TIPPED MALLET

FOR THE HOME AND WAR INDUSTRIES

Every war production plant needs SOUTHWEST Plastic Tipped Mallets. They can be used for sheet-metal work, radio, electrical work, caulking, lamination, upholstering, and assembly work of all kinds.

They can also be used on metal and plated surfaces without any damage to the material. Extra plastic tips are immediately replaceable by hand because they are threaded.

Please send \$1.00 for postpaid sample mallet and price list.



CROSS POINT TIP



BALL POINT TIP



SAMPLE
ONLY
\$1.00
POSTPAID

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BUSHINGS AND SPACERS of every kind

Made on special machines to ensure uniform accuracy and low cost.

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Lasosol Class A, B, or C.

Qualities, A. S. A. Standard, or to your own specifications.

Nothing finer made.



Quick deliveries of large orders.
Annual capacity of 1,500,000 Precision Bushings.
Small orders from finished or semi-finished stock.

—Catalog A M 2 B on application—

SPECIALISTS IN QUANTITY MANUFACTURE OF FINE TOOLS, PARTS & GAGES REQUIRING THE CLOSEST TOLERANCES.

Special facilities for making the most difficult Bullet Dies, Punches, etc.

FREDERICK M. LASERSON CO.
6518 Avon Blvd. Los Angeles, California

Electrode for "Fleet-Fillet" Welds

A new arc welding electrode, designed to add still more speed to arc welding in war production, is announced by The Lincoln Electric Co., Cleveland.

Designated as "Fleetweld 11", it is created expressly for use with the recently announced "Fleet-Fillet" technique.



"Fleetweld 11" is not only a fast flowing electrode, but gives deeper penetration of metal into the root of the joint. It is of shielded arc type and heavily coated to exclude oxides and nitrides from the weld.

In demonstration, it is said the new electrode welded in 35 seconds a joint that required 1 minute 17 seconds to weld with conventional electrodes and ordinary procedure.

The new electrode and the "Fleet-Fillet" technique are claimed to permit up to 100 per cent faster fillet welding, and to cut production time on welded ships, tanks, guns and other strategic war materials, and permitting the operator to do more work without fatigue. Welding costs are decreased as well as the amount of electrode used per foot of weld.

HIGH SPEED RIVETING HAMMERS

Built in 10 sizes to cover a complete range of riveting from smallest to 1½" diameter solid shank.

Submit sample assemblies ready to rivet with rivets for demonstration.

Send today for literature.

HIGH SPEED HAMMER CO., INC.
ROCHESTER, NEW YORK, U.S.A.



The New CATSKILL — WET-TYPE Abrasive Cut-Off Machine



Abrasive wheel cutting is the modern way to speed up operation and lower cutting cost. This machine cuts tubing to 3", solids to 2" accurately, smoothly. Especially recommended for cutting high alloyed hard steels and many other materials. Designed and engineered for high production, ease of operation, safety, and long life. Prompt delivery.

*For detailed information, write for
Bulletin No. 6.*

**CATSKILL METAL WORKS, INC. — CATSKILL
NEW YORK**

High currents are used, the electrode is advanced at a higher speed and the weld metal penetrates into the corners where the 2 pieces of metal are joined. The electrode is held at an angle of 45 to 60 degrees with the horizontal plate and 90 degrees with the electrode path along the joint. The arc produced is so short, the electrode coating practically touches the metal.

Having the same strength as a weld made by ordinary methods the "Fleet-Fillet" weld requires less metal. In a

typical instance, the new technique required 0.26 pounds of electrode per foot, as against 0.37 pounds by the usual procedure. The cost, now further reduced by the new "Fleetweld 11" electrode, is reported 33-1/3 to 50 per cent less than the usual procedure.

Designed to complete a weld in one pass, "Fleetweld 11" is made in 18" lengths and 2 diameters, 3/16 and 1/4" packed in 50 pound cans.

Tool Bits for Hard, Tough Metals

A new line of tool bits for machining hard, tough steels and the copper or aluminum alloys recently has been made available.

These tool bits are made of the same metal that has proved its value to industry in the patented "Hardsteel" drills—also used in "Hardsteel" reamers. This new metal has many advantages when used in tool bits. It is claimed to have greater shock-resistance than most cast or cemented tools—minimizing breakage. It shows higher heat-resistance—permitting higher cutting speeds and deeper cuts.

"Hardsteel" tool bits should fit admirably into war production wherever lathes, boring mills, shapers and planers with tool lifters work on hard or tough steels, such as the 4100 series, the high chrome, high nickel and high speed tool steels. Complete satisfaction is also reported when used on abrasive copper, brass, bronze and aluminum alloys, either rolled or cast. They are especially suited to work on heavy forgings where deep rough cuts can be made at faster cutting speeds, but at the same time, give excellent results when used as finishing or forming tools.

Two other factors make these tool bits inexpensive in use. Since they are of solid "Hardsteel" they can be reground on an ordinary wheel time after time. But because they take abuse and operate efficiently at red heat, they need less frequent regrinding.

The bits are made square or round, from 1/8" up in all the usual sizes by Black Drill Co., 5005 Euclid Ave., Cleveland, Ohio.



MOTOR MICA

REG. U. S. PAT. OFF.

ANTI-FRICTION COMPOUND

Motor-Mica will solve your toughest lubricating problems. Prevents metal to metal contact. Cools HOT BEARINGS. Speeds up Stamping, Turning, Drilling, Milling, Threading, Boring, Tapping, Die-Casting, Screw Machine and other operations.

Packed in
1-5-10-25-50 lb.
Containers

SCIENTIFIC LUBRICANTS COMPANY
Dept. H., 3462 N. Clark St., Chicago, Ill.

Write for trial offer today!

IF ACCURACY -- PLUS IS WANTED-- Get | SMITH MASTER SURFACE PLATES



Smith Surface Plates will give you the maximum freedom from distortion with a minimum of deflection. Original design insures ample rigidity and stiffness for accurate measuring. Smith Surface Plates are satisfactorily meeting the tests of the country's leading precision toolmakers. You'll want detailed information and descriptive literature. Sent free on request.

SMITH TOOL & ENGINEERING CO.
(Formerly Smith Tool Works, Inc.)
848 N. Sandusky Ave. Bucyrus, Ohio

AVAILABLE SIZES

8" x 12"
9" x 14"
12" x 18"
18" x 24"
20" x 30"
24" x 24"
24" x 36"
30" x 36"
30" x 60"
36" x 60"

Other sizes made
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For AIRCRAFT and MUNITIONS



**1883
GREENERD**

The Originators
of the
Arbor Press

1941

PRECISION WORK IN REARMAMENT

65 Standard Styles and Sizes. Manually operated presses $\frac{1}{4}$ to 35 tons pressure. Motor driven hydraulic presses $1\frac{1}{2}$ to 30 tons pressure.

Let us send you our catalog No. F.

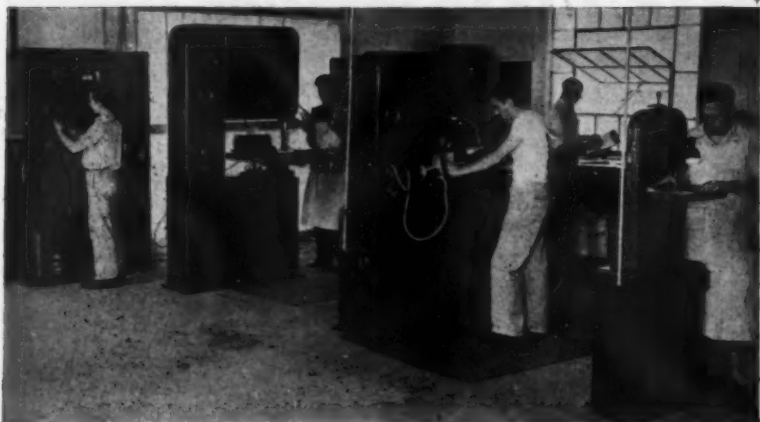
GREENERD ARBOR PRESSES

NASHUA

Est. 1883

NEW HAMPSHIRE

The Doall Contour Saw Laboratory

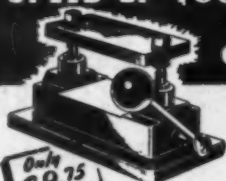


The manufacturers of Doall Precision Saw Bands announce the further expansion of their Contour Saw Labo-

ratory, and the housing of this department in a building separate from the main plant, 1206 Thacker St., Des Plaines, Ill. Foremost in customer service departments, the Laboratory has long been called upon to solve the cutting problems of narrow blade saw users thruout the country. Now, more than ever before, buyers everywhere have need of the data assembled by these technicians.

Superbly equipped — complete from photomicrograph and Rockwell testing equipment to a special darkroom, the laboratory solves cutting problems (without charge) presented either by mail or thru territorial representatives.

SPEED UP TOOLING- CUT COSTS



Only
29.75

with the
**UNIVERSAL
VISE**

Save tooling time. Build your fixtures around a completely pre-designed drill jig body.

Save production costs. Savings up to 60% in drilling time not uncommon. Lever locks work instantly—holds securely. Throw it back and work is released. No complicated adjustments. Save cost of expensive drill fixtures —just a bushing plate and adaptor needed for each job.

Order today. Please include contract number or priority certificate. Write for bulletin.

Mohr Lino-Saw Co.

136 N. Union Ave.

Chicago, Ill.



THE BARNES

**Motor Driven Precision
Cutter Grinding Machine**

For precision Grinding
Formed Milling Cutters
used in the manufacture
of rifles, pistols, etc.

General Machinery Corp.

140 Federal St., Boston, Mass.

Telephone Liberty 4826

THE MIDGET



HALF
SIZE

We can supply this Indicator with or without lug on back. Also with support arm for mounting on surface gage. Light weight makes it ideal for use with magnetic base.

Waltham Dial Gage Co.
STOW, MASSACHUSETTS

VERTICAL MILL and JIG BORER

A simplified, precision tool for milling, boring, facing and routing small parts for instruments and arms, munitions, etc.

Spindle dia. at driving end, $\frac{1}{2}$ ", 1150 and 1750 r.p.m., 5 Speeds. 12" longitudinal travel of table, 7" cross travel, 4" Spindle feed.

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AG & S Representative
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Exclusive Agents

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Model
S-1

You can speed output on Dies
—Gages—Cams—Templates—
Experimental Work—
You can use less skilled operators.

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Drill Grinders—
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Large Savings—Small Investment.

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Faster Identification of Inspectors or Operators. Different borders may be used for different shifts. Available in 4 sizes. Write for prices today.

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POWER
PRESSES**

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successors to Lathbough-Jordan Tool & Machine Co.
1625 STERLING AVE. ELKHART, INDIANA

At the conclusion of each test, when the question has been answered and a plan for production sawing worked out, a detailed report is sent to the customer. To this is attached a photograph of the actual cutting, also drawings (where required) showing the progressive cuts, and recommendations for jigs or other fixtures.

Among recent tests have been one which called for designing a self-centering jig for notching precision machine parts within close tolerances without a layout line, and another which involved a "two at a time" operation in machining machine gun slides. Working new plastics; sawing materials which are new to plants converting to war work, helping users choose the best saw width and pitch for cutting materials which replace others given over to the making of vital parts; all these come within the scope of the Laboratory.

Frequently recommendations can be given over the telephone or by wire—sometimes days are spent in determining the best possible combination of finish and cutting time.

Saves Handling Equipment

A new, condensed catalog, issued by Lyon - Raymond Corp., 1017 Madison St., Greene, N. Y., points out that the average dollar invested in material handling, these days, releases 1 to \$3 worth of labor for other defense work, each year. Makers of hydraulic lift-trucks, elevating and other equipment, this latest catalog No. 130, presents handling devices that run virtually the entire gamut of industrial needs to step-up production with safety and economy.

Among the hydraulic apparatus detailed are lift trucks, pallet trucks, elevating tables, die-handling trucks, sheet-handling trucks, stacking, tiering, hoisting equipment.

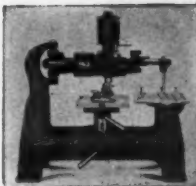
The firm also manufactures aircraft servicing and production equipment and special-purpose production machines, hydraulically powered.

Speed Up Your Riveting Operations



A great help in War Production, these Grant Riveters are available in Noiseless Spinning and Vibrating Hammer types, also Vertical and Horizontal Multiple Spindle Spinning Machines. Information? Write!

THE GRANT MFG. & MACHINE CO.
C. E. Station, Bridgeport, Conn.



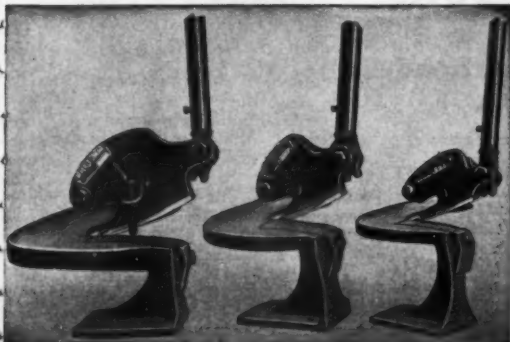
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marking...

THE PANTO ENGRAVER, ELECTRICAL MARKER AND ACID ETCHER

Pantographic bench - type machine with interchangeable heads for three classes of work. Accurate, easy to operate, built for long reliable service.

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Speed-Up
**WAR
ORDERS**
with

BEVERLY THROATLESS SHEAR

If you're cutting straights—rounds or irregulars on War orders you can speed 'em up and eliminate distortion with a BEVERLY Bench-Type Shear. Order No. 1 for 14 Ga., No. 2 for 10 Ga., No. 3 for 3/16" mild steel and 10 ga., stainless.

BEVERLY SHEAR CO., 3805 W. 110th Pl., Chicago, Ill.



VIMCOLIGHT... On the Work Fluorescent Overhead

*... An Ideal Combination
for Sharply Reduced Eye Fatigue!*

Install **GOOD LIGHTING ... GET INCREASED PRODUCTION!** Good lighting recognizes the **added value** of direct, non-glaring **VIMCOLIGHT** illumination concentrated **on the work ... as a necessary supplement to today's modern, over-all fluorescent installations.**

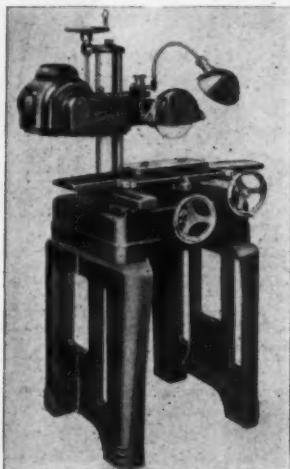
Adjustable to scores of positions. Standard equipment on hundreds of America's finest machine tools ... **VIMCOLIGHT** rates **YOUR** consideration!

VIMCOLIGHT

VIMCO MANUFACTURING CO.
109 GREENWOOD ST. BUFFALO, N. Y.

Delta Surface Grinder

A new type surface grinder is announced by the Delta Mfg. Co., 604K—E. Vienna Ave., Milwaukee, Wis. It is versatile, easy to operate, portable, low in cost and it should be useful in tool and production shops. Interesting features include:



(1) A unique wheel-mounting arrangement that utilizes a 2-piece adapter, so that either wheel, or wheel and adapter, can be removed. The advantage of this is that once a wheel has been trued up, it can be removed and replaced with the adapter and without any further dressing.

(2) A carefully designed spindle, which is the "heart" of any grinder, is made extra-long with widely spaced bearings at either end, for permanent true alignment. The forward bearing is a large surface taper bronze bearing. It runs in a continuous bath of oil. A take-up is provided to eliminate play. Rear bearing is a sealed-for-life bearing that requires no lubrication.

(3) Improved table, smooth operating, with conveniently located control handles. The table has long ways so

WIPE OFF RUST and BURNS WITH SOL-KLEAN

Simply wet a rag with Sol-Klean and wipe away all Stains, Burns and Rust.

NON — INFLAMMABLE

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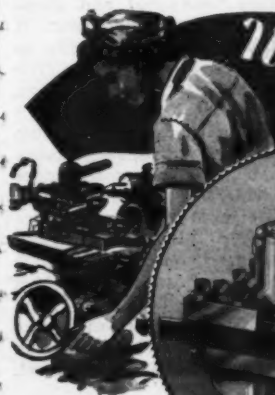
NON — CORROSIVE

**INDUSTRIAL CHEMICAL
PRODUCTS CO.**

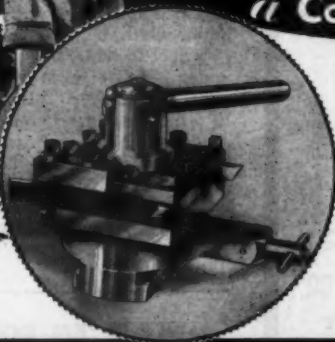
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Milwaukee



*Now a girl operator
can do that job with
a Colwell Turret*



An inexperienced operator can quickly change from one tool to another with our four tool post turret. Positive locking device—quickly and accurately indexed.

Send for new folder.

S.G. Colwell 25 Congress Ave. Prov. R.I.

Time-Saving Economy Tools

NICHOLSON EXPANDING MANDRELS



TYPE A—STEP JAW DESIGN

Especially adapted for holding work with small bores while being machined between centers on lathes, grinders, millers, shapers, etc.

Size No.	Range of Bore Taken	Net Price
1A	1/4" to 1"	\$12.00
2A	1" to 1 1/2"	16.00
3A	1 1/2" to 2"	23.00
4A	2" to 3"	34.00
5A	3" to 4"	40.00



TYPE B—STRAIGHT JAW DESIGN

Adapted for work with both short and long bores.

Size No.	Range of Bore Taken	Net Price
1X	1/4" to 9/16"	\$10.00
2X	9/16" to 21/32"	11.00
3X	21/32" to 3/4"	12.00
00	3/4" to 7/8"	14.00
0	7/8" to 1"	16.00
1	1" to 1 1/4"	18.00
2	1 1/4" to 1-9/16"	21.00
3	1-9/16" to 2"	29.00
4	2" to 2 1/4"	40.00

(Other Sizes Taking Up to 7" Bore)

Hardened tool steel, accurately ground. Sold singly or in sets. Prompt delivery. Write for bulletin.

W. H. NICHOLSON & CO.
117 OREGON STREET
WILKES-BARRE, PA.

Wrigraph PRECISION DRAFTING MACHINE

Brief Case Size Illustrated.

New large **INDUSTRO** Drafters available — tubular arm, ball-bearing machines. Complete range of sizes up to 36"x48".

Free trial offer and catalog on request.

L. C. WRIGHT, INC.
6293 CARNEGIE AVE., CLEVELAND, OHIO

that it never "hangs" over end of machine—but is always riding solidly on the ways. Gibs are provided so that play may be eliminated. Micrometer collar, with wide graduations on the traverse adjustment permits accurate settings. The table is provided with T-slots for clamping fixtures or magnetic chuck in place.

(4) The specially designed column is of one-piece construction, cast of hi-tensile iron, normalized and accurately ground to close tolerances. A steel gib guides the bracket yoke so that it is always in alignment. The entire column, together with bracket, may be rotated 360°.

Actual specifications are:—Maximum length that can be ground, 13 1/2"; maximum width, 6"; maximum space under 7" wheel to table, 9 1/2"; maximum space under 7" wheel to B & S No. 510 Magnetic Chuck, 6"; Table surface 5 3/4"x 13"; Traverse feed, one graduation is .001"; maximum adjustment of wheel by means of micrometer is 3/8". Each graduation is .0005". Minimum diameter cup wheel with standard guard in place, 3 1/2"; maximum diameter wheel, 7".

"KEEP 'EM ROLLING"
Buy United States War Savings
Bonds and Stamps

THE WILL TO WIN

(as spontaneously expressed by a Cushman employee)

Some time ago when the enemy struck
"Right into high" went Cushman Chuck
Machines were pushed . . . with the dedication
"MAKE MORE CHUCKS to protect the nation".

We'll make the chucks for many a lathe
To turn the enemy into his grave
To build a gun . . . and finish a plane
And drive the Axis back again.

Some of the boys have gone to war
To fight for the things worth fighting for
So it's up to us to help this crew
That worked at a bench with me and you.

The more we produce and the more we give
Will make more certain our pals will live
They'll be thinking of us in foreign lands
With thanks for a chuck and for what it stands.

They know what it means as a tool of war
They know from the battle just what it's for
That without a gun there'd be no pluck
And THERE'D BE NO GUN without a chuck.

So all of us here at Cushman's work
Will boost production . . . never shirk
With a steady stream of chucks for the nation
. . . America . . . Cushman . . . cooperation.

Eugene Pilkington

WORLD STANDARD TOOL PROCESS

CUSHMAN

THE CUSHMAN CHUCK CO.

HARTFORD, CONN.



LONGER LIFE for CENTERS when HARD FACED with

COLMONOY

Hard Surfacing Alloys and Overlay Metals

COLMONOY faced centers last from 3 to 5 times as long as centers of high speed steel. The unground centers pictured here—unretouched—have been coated with COLMONOY No. 6. Note the uniformity of these oxy-acetylene welding applications.

The extremely high wear resistance of the hard surface of COLMONOY overlays will protect all vital wearing parts in the machine tool industry. Mild steel parts coated with COLMONOY alloys wear from 3 to 10 times as long as new parts made of high alloy steel.

WRITE TODAY

Learn about COLMONOY and what it is doing to conserve vital metals.

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BRANCH OFFICES AT NEW YORK CITY, BLASDELL, N. Y., CHICAGO, TULSA, WHITTIER, CALIFORNIA. OTHER BRANCHES IN CANADA.



COLMONOY

Hard Surfacing Alloys and Overlay Metals

Arbor Supports

Importance of milling machine arbor support design is greater than may ordinarily be supposed. To have a support relatively light in weight, and which will readily slide off and on to the overarm, is to have a decided operating advantage. In common with other places where lightness of a machine part is important, aluminum has been used for making some of these supports by many leading milling machine builders. In one miller, the sup-

ports are cast from a special aluminum alloy, and are heat treated to give additional stamina. These supports slide on dovetailed ways on the overarm.

Have you ever seen a center arbor support for a milling machine arbor that was made in halves? One outstanding milling machine manufacturer made a machine of this kind and put it on the market a number of years ago. It is a very clever touch in milling machine design. There are 2 cylindrical overarms on the machine, arranged in parallelism, and the 2 halves of the center arbor support mentioned are mounted on these 2 overarms, so that they will swing or hinge thereon. It follows

that when it is desired to remove the arbor, it is only necessary to unlock the 2 halves of the center support (they are designed to lock together) and swing each aside on its own overarm. This feature is especially valuable where it is desired to keep the setup on a given arbor undisturbed, for some standard job, and allow cutters to be set up in advance on another milling machine arbor for the next job. There is less down time for the machine by following this process.

SAVE EYES—SPEED WORK

This new Magni-Focuser Binocular Eye-Shade has dual-mounted lenses—ground from the finest optical glass—which magnify an object approximately three times its actual size to needle-point sharpness. This binocular design gives third-dimension vision—which is impossible with a "one-eyed loop". Prisms in each lens relieve eye-strain, and the shade shuts out all glare. Fits over regular eye-glasses. Non-breakable, non-inflammable. Order one or more now for a 10-day trial. If you are not fully satisfied your money will be refunded. Price \$8.50, cash with order.

N. L. HUERSCH, SELLING AGENT, 81 YALE ST., E. WILLISTON, N.Y.



MAGNI-FOCUSER
Binocular Eye-Loop

"O-U-Tack"

A new professional tack rag, the O-U-Tack, said to eliminate the use of solvents and save time in cleaning dust and over-spray prior to painting, is announced by the Robinson Specialty Mfg. Co., 816 West Fifth St., Los Angeles, Cal.

The O-U-Tack is flexible as to tackiness and does not dry out in storage. If the user desires more tackiness, a small amount of heat can be applied; if less tackiness is desired, the rag may be hung in the open air. O-U-Tack is said to be particularly applicable when preparing aircraft skins for synthetic enamel as it completely removes metal dust and other minute particles developed in drilling and riveting. Full-sized free samples are offered to anyone writing for them on a firm letterhead.

A safety feature of vital importance in paint shops today is O-U-Tack's immunity to spontaneous ignition.



**LOW TEMPERATURE
WELDING**

NEW METHOD REVOLUTIONIZES WELDING CASTOLIN EUTECTIC ALLOYS

Salvage defective castings . . . save "hard-to-get" parts . . . speed-up production . . . with this new welding development. CASTOLIN binds without melting the base metal. This means high strength, matching color. It means less stresses, less warping, less preheating.

WELDS: Cast Iron, Iron, Nickel, Steel, Aluminum, Bronze, Copper, Brass, Magnesium, etc.

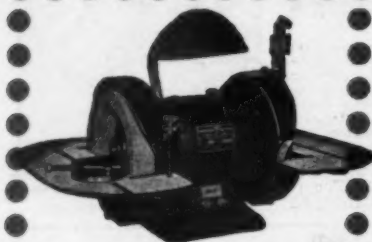
EUTECTIC WELDING ALLOYS, INC.

40 Worth Street,

New York, N. Y.

WRITE TODAY

Learn about Welding's Greatest Achievement
Write on firm letterhead for 32-page book on
"Low Temperature Welding".



Prosser CARBIDE TOOL GRINDER

Quick Deliveries from Stock

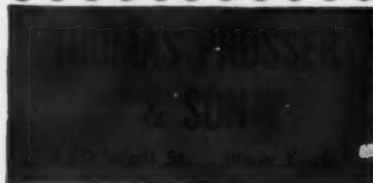
Removes metal fast when rough grinding.

Finish grinds smooth, keen cutting edges.

Oversize 7" wheels give greatly increased wheel life.

This grinder will quickly pay for itself by increased tool performance and life between grinds.

**Write for details
of this and heavy duty
Carbide Grinders**



LOCKERS



SHOPROBE
(Eng. No. 2 202-427)



ENGINEERED IN
WOOD
FOR THE DURATION
CABINET

Three products necessary to war-time industries but limited by steel priorities are now offered in wood by Lyon Metal Products, Inc., 3042 Clark St., Aurora, Ill. They are shoprobes, lockers and cabinets. Portable shoprobes provide full length coat-hanging space, private locking compartment at convenient height for each employee, and are especially suited to industries in which personnel fluctuates and low storage cost is required. 20-person unit (double-faced) requires only 13-3/5 sq ft of floor space. 10-person unit (single-faced) requires only 6-4/5 sq ft. Lockers have hardwood tops, bottoms and frames. Sides, backs and doors are pressed wood. Doors consist of 2 panels of pressed wood mounted on hardwood frame. 5 stock sizes are available—4 single tier and 1 double tier.

Cabinet tops, bottoms and frames are hardwood. Backs and sides are pressed wood panels. Doors are made of 2 pressed wood panels mounted over hardwood frame and attached with 3 tight-pin hinges. Three types—storage, wardrobe and combination. Two sizes: 36"x18"x72" and 36"x24"x72".

All units finished inside and outside in green enamel.



**NOTHING
LIKE
RESERVE POWER**

Reserve power built into your products gives them a competitive advantage in performance. RACINE Variable Volume Pumps have that extra reserve as they pump only the volume oil actually required by the circuit. In those operations requiring holding, pressing, clamping and forming, they maintain pressures from 50 to 1000 pounds without wasting horse power normally spent in by-passing oil and in oil heating as in constant volume systems. RACINE Variable Volume Pumps are made in three sizes to give the maximum volume desired from 0 to 12, 20 or 30 gallons per minute.

Write for complete details and specifications in our new catalog P-10-C. Our engineers will be glad to show you how our equipment can be readily designed into your products to give them added power reserve.



RACINE TOOL & MACHINE CO.

1754 STATE STREET · RACINE, WISCONSIN

Localized Annealing

Different methods have been resorted to for annealing spots of steel parts. Some have used makeshifts of different kinds with more or less indifferent success. There is some understanding that in jig, fixture and die work, resistance welders may be used successfully to anneal in certain spots or areas, in order that those portions may better resist shock, or to soften the material in some degree for later machining operations.

baffles come into position to reflect the heat on the work, and then retire, all automatically.

Localized annealing machines can be designed for practically any type of work, and there are firms experienced in this line that are ready to furnish either tip or fishtail burners for this purpose.

Possibly the method found best where there is considerable local annealing to be done continually, is to use some sort of gas-fired equipment. It allows heat to be closely localized and governed, and thus allows of more uniform results. One automatic, gas-fired annealing machine will spot-heat steel parts up to 2 ft in diameter. The machine is especially designed to save gas, in that it consumes about 100 cubic ft per hour per burner while it is actually heating the work, but during the loading periods of the equipment the burners are throttled to a rate of around 15 cubic feet per hour. The work moves into place and out, the burners are turned on and throttled, and reflecting

**Buy U. S. War Savings
Bonds and Stamps**

For Removing Stresses In Weldments

To remove stresses in weldments, a large midwest farm implement plant has installed this new type car-bottom stress relief furnace. The new furnace, designed by Despatch Oven Co., 722 Central Ave., Minneapolis, Minn., has completely automatic heat control.

Simple operation of a few dials provides desired time-and-temperature combinations for pre-heating, soaking and cooling.

Weldments are loaded on rugged, heavy-duty, insulated cars which enter the furnace through either of 2 lift doors at opposite ends of the heat chamber. Thus 2 cars may be used, 1 being loaded while the other is in the heat chamber.

Car-bottoms, usually operated by winches, are carefully levelled when installed. This permits correct balancing of loads and minimizes danger



of distortion which might result from off-level car platforms.

Effective sealing of the work chamber to promote even interior heating is provided. Electrically operated doors at each end of the furnace slide down smooth channels to form sand-seals at both ends of the car. As these doors

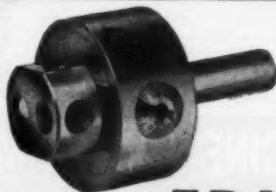
NEDCO Electric **SANDING—RUBBING MACHINES** SOLVE YOUR SURFACING PROBLEM

Rotary or Oscillating
types.



Write
for
circular.

THE NEDCO COMPANY
WALTHAM MASS.



Micrometer FRAY OFFSET BORING HEADS

Offsets $\frac{1}{2}$ "—Head $2\frac{1}{2}$ " overall
Micrometer Dial—50 divisions—.001".
Three Tool Holes—one hole runs true
with arbor.
All parts nickel-chromium steel, SAE 340.
Two $\frac{1}{2}$ " Boring Bars fitted with H.S.
Tool Bits and Three Wrenches with each
head.

FRAY MACHINE TOOL CO.
501 W. Windsor Glendale, Calif.
Manufacturers of "All Angle"
Milling Machines and Attachments

PRECISION GROUND FROM SOLID STOCK

*Guaranteed accuracy,
unfailing durability—
both are integral parts
of each Sossner tap.
The name is your
assurance of de-
pendability and
performance.*



A rep-
utation
for relia-
bility—gain-
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one years of
precision work-
manship in tools and
dies—stands behind the
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225 CENTRE ST.
NEW YORK, N. Y.

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26 BROADWAY
LYNBROOK, L. I., N. Y.

descend to the bottom of the channel-
grooves they are forced snugly against
properly designed steel members. Fin-
ally, sand—flowed mechanically along
sides of the car bottom — completes
sealing of work chamber.

Secret of close temperature control
lies in balancing of heater, fans, and
circulating ducts on each installation.
Heater is of heavy capacity, connected
with a specially designed high-volume
fan of alloy steel. Each fan is delicately
balanced with extreme care and has
patented shaft-cooler to withstand
hard, continuous operation with least
attention or repair.

Distributing ducts have graduated
ports, each tested with an anemometer
and adjusted accordingly. Adjustment
is always made after the furnace is
installed so that fast, even flow of
heat thruout chamber is obtained. Re-
ports from various installations, says
the maker, show heat distribution thus
secured is highly uniform.

Automatic control equipment permits
operator to follow predetermined cycles

of heat treatment, simply by setting the
dials. Control covers any desired time
and temperature thru pre-heating,
soaking and cooling. When specifica-
tions for a new load require a different
time or different temperature, new
control settings can be made instantly—
an important factor in flexibility.

Williams Powerplant Equipment

The Williams Gauge Co., 2073 Penn-
sylvania Ave., Pittsburgh, Pa., offers
Catalog No. 142 describing its com-
plete line of power plant equipment.
This new 24-page catalog, which is
profusely illustrated, contains technical
data on such Williams Specialties as
pump valves, water gauges, steam
pump governors, gauge cocks, ball-
type high pressure steam traps, safety
feed water regulators, high and low
alarm columns, flanged silent check
valves and standard feed regulators.

Copies of the catalog will be for-
warded gratis if requested on com-
pany letterheads.

It Lifts . . . It Carries . . . It Supports

PORTELEVATOR

Portable Elevating Table

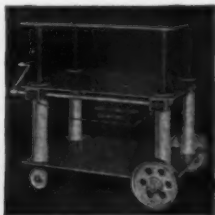
One of the greatest time and labor savers for your plant. It does almost everything. Also serves as table for overhang work.

Special sizes up to 20 ton capacity... standard smaller sizes, too.

Dent. B-10

THE HAMILTON TOOL CO.

Ninth and Hanover Streets,
HAMILTON OHIO



Heat Treat Bulletin

Park Chemical Co., Detroit, maker of Park Salt Baths, announces appointment as exclusive sales representatives for territories east of the Mississippi (except Iowa) for Thurner Carbo-Cleaner, machine used for cleaning used carburizing compounds.

New bulletin No. 100, just released by the firm, details its salt baths for heat treating carbon and alloy steels, high speed steels and non-ferrous metals. In internally-heated furnaces, capable of "case" depths to .125" and with temperature range of 300°-2400°, the firm advances salts as a highly efficient heating medium, due to higher thermal conductivity, cleanliness, prevention of scaling and decarburization, with minimum distortion, cracking and pitting. The bulletin gives complete details.

Park has pioneered in the field of liquid and solid carburizers, developing, in 1911, Woodside's Rapid Carburizer.

The firm will exhibit at the National

Metal Exhibition, Cleveland, in October.

Haskins Jr. Catalog

Stressing the innumerable occasions for use of flexible shaft machines in the average shop and illustrating types for applications most commonly encountered, R. G. Haskins Co., 623 S. California Av., Chicago, has issued a 3 1/4 x 6 1/4" Junior Catalog, No. 1-F.

Some 23 types are detailed. They range from machines adaptable to light work to large, casted models for heavy grinding with wheels up to 6" diam.

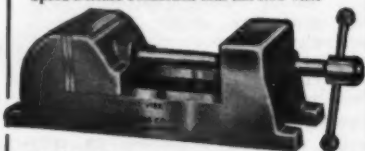
Two types of the firm's line of power screwdrivers are also described and illustrated.

The Jr. Catalog, says the firm, is intended to portray the wide range in the Haskins line of flexible shaft machines.

The booklet is a valuable treatise on the versatility of flexible shaft machines, with illustrations of models and their especial adaptability to specific jobs, many of which are covered throughout its 30 pages.

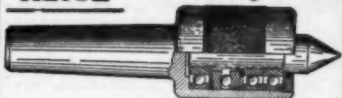
DOUBLE YOUR DRILL PRESS CAPACITY

Minutes are Seconds with the new TWISTITE Vise.
Opens to full capacity in one second.
Speed Defused Production with this New Vise.



J. A. Richards Co., Kalamazoo, Mich.

"ALIVE" Ball Bearing Centers



"They turn with the work"

Write TODAY - and let us tell you more about them.

MODERN MACHINE CORP.
323 Berry St., Brooklyn, N. Y.

Rotorex GRINDER
FOR ALL TOOLS
PROMPT DELIVERY
BY LARGE SCALE PRODUCTION



DOUGLAS MACHINERY CO.

150 BROADWAY

NEW YORK, N. Y.

Wins \$200 CAI Award

Describing successful application of compressed air to increase speed of producing cartridge cases by about 500 per cent, A. W. Lancaster of Orillia, Ont., received first prize of \$200 in the Compressed Air in Industry Contest.

Award was made by the Compressed Air Institute of New York, which conducted the contest to increase the widespread interest and application of compressed air in industry, transportation and many other activities.

tridge case machines had at first been increased 100 to 150% by substitution of air operated mechanism to locate cases in the machine and eject them. This not only increased efficiency of production, but reduced operator fatigue.

Compressed air was turned on and off by a hand lever situated on the headstock of the lathe. The next step was to eliminate the hand lever. Lever was replaced by a dual control air valve conveniently situated on bed.

There were 3 second prizes of \$100 each and 10 third prizes of \$50 apiece for papers showing many striking advantages of compressed air in industry and national defense.

One of the second prizes went to Irving G. Mayer of Phoenix, Ariz., a chemist at Arizona Refining Company, who showed how compressed air may be used in rapidly laying a mat of asphalt on roads and other structures. Asphalt, mixed with rock or stone aggregate, is shot thru a nozzle onto the pavement or other place where it is to be applied. He pointed out that this method would be especially useful in national defense if a road is blown up by a bomb and must be repaired at once.

Winner of the Compressed Air Institute's first prize told how efficiency of car-

The ZAGAR COLLET INDEX

FIXTURE

*Speeds up
Holding and
Indexing*



The Zagar Collet Index Fixture can be used on any standard milling machine to mill slots, hexes, keyways, punches, taps, and to perform many other operations.

FOR MILLING, DRILLING, TAPPING, GRINDING, SLOTTING

The Zagar Collet Index Fixture can be adapted to practically any type of collet. It makes hexes, squares, slots, keyways, and holes. Two types; for holding and indexing or for holding only, each in 1" and 2" capacities. One handle opens, closes, and indexes. Any division from 2 to 25. No chip trouble, since the oil comes up through the collet to lubricate and clean out. Easy to set up; extremely simple in design.

Ask for our descriptive Bulletin "B"



ZAGAR TOOL, INC.

23880 Lakeland Blvd.

Cleveland, Ohio

Defense Lighting

New developments in war-time lighting, including use of "glare barrages" to protect vital industrial plants, were described at a recent 3-day meeting of field engineers of the Westinghouse Electric & Mfg. Co. Lighting Division. A glare barrage is just the opposite of a black-out, bright lights and glare being used to confuse air raiders in locating specific targets.

Among lighting innovations discussed was use of horizontal glare barrages

which blind potential saboteurs during attempts to enter industrial properties, yet at the same time provide perfect visibility for plain policeman to detect intruders placing them at a discouraging disadvantage, which should materially reduce the hazards of this type to plants thus equipped.

Announcement was made at the conference of a new type fluorescent lighting unit which cuts steel requirements per unit from 16½ down to 8½ lbs thus releasing many hundreds of tons of steel for armament production.

Application of a new 3 - kilowatt high - intensity mercury lamp for war production industries was also discussed at the conference. Noting that WPB has placed special emphasis on use of adequate levels

of illumination to provide top speed vision for workers engaged in the production of vital war goods, the new unit was designed for industrial use to meet this need.

How airports in combat areas must provide for operations in blackouts by "strip" lighting was described by W. C. Norvell, Westinghouse aviation lighting engineer. Strip lighting, he explained, means that a pilot takes off or lands between two strips of lights lining the runway, while the remainder of the airport is in darkness.

Gray-Mills Offer New Coolant Line

A new line of quality metal cutting coolants has been developed by the Gray-Mills Co., 215 W. Ontario St., Chicago, enabling their nationwide distribution outlets to offer immediate deliveries from stock. Realizing the inconvenience to many shops of purchasing large quantities, the new "Flo-Bac" coolants are offered in a wide range of container sizes:—3, 5, 15, 30, 50, and 55 gallons. They are manufactured in 4 types to cover practically every requirement and are available in wooden containers (to conserve steel and expedite shipments) on priorities up to A-10. Steel containers require A-1-J or better.

Their new "Flo-Bac" coolants, com-



bined with the Portable Coolant Systems, make it possible for this company to offer a complete answer to the problem of obtaining cutting fluid advantages on all small, large, or special machine tools.

TANNEWITZ High Speed METAL CUTTING BAND SAWS

Fastest and best known means of cutting sheet steel, aluminum and magnesium sprues, gates, risers, and kindred items. Provides saw blade travel of over 2 miles per minute with perfect safety. Cuts are exceptionally smooth. Labor savings ranging from 25% to 90% are the usual thing.

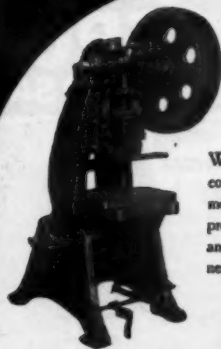
For complete details simply write for bulletin on metal cutting band saws.

Built by Saming Machinery Specialists



THE TANNEWITZ WORKS
GRAND RAPIDS, MICHIGAN

RECLINABLE POWER PRESSES



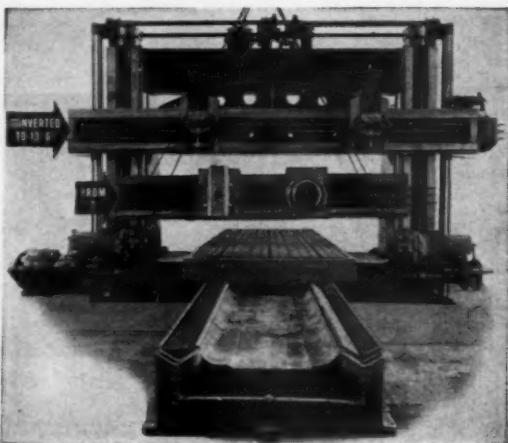
We manufacture a complete line of mechanical power presses, with sizes and types for every need in your shop.

Write for bulletin.

ZEH & HAHNEMANN CO.
Newark, New Jersey

Converting Planer to Larger Size

The illustration presents an unusual job of machine tool rebuilding and is indicative of the all-out conversion achieved by industry to speed the war effort. This planer, owned by the Vulcan Iron Works, was converted by the Simmons Machine Tool Corp., Albany, N. Y., from 7' between housings to 13' 6" between housings. Vulcan needed such a planer for producing the main engines of heavy cargo vessels. A new one would have involved waiting nearly a year. So Vulcan sent an available planer to Simmons to be converted to the desired width.



Simmons took this planer and, by

providing a new rail and bridge, together with widening blocks between the housings and the bed, converted it to 13' 6". This photograph shows the comparison between the new rail and the old one directly beneath it.

E. Perry Holder, Vulcan president, wrote:—"The time for getting a planer of these specifications into production was shortened 75% by your Rebuilding Program, thus enabling us to speed up our deliveries and help the transportation problem in general."

LIKE MAGIC
GROB
OPEN END SAW

No Saw Welding
Instant Internal
Sawing

Unsurpassed in speed, efficiency and accuracy of sawing small and medium sized dies as well as miscellaneous parts.

THE TOOLMAKER'S
BEST FRIEND

Write or wire
for details
and prices

GROB BROTHERS
GRAFTON WISCONSIN

"ALNOR"
PYROMETERS

for every requirement.

Inexpensive,
accurate, durable.

Write for catalog.

Illinois
Testing Laboratories, Inc.
150 W. Hubbard St., Chicago



A CLAMP for Every Purpose



Forged Steel
Quick Acting
Deep Reach
Welders



Sizes Available:
 $\frac{3}{4}$ " to 10' opening
 $\frac{1}{2}$ " to 16" deep

Write for CATALOG and PRICES on Clamps for all purposes as well as many other tools for use in the Machine Shop.

IN STOCK AT YOUR SUPPLY HOUSE

The Cincinnati Tool Co., 1945 WAVERLY AVE., CINCINNATI, OHIO

The Coolant Pump For Every Job—

BRADY-PENROD MODEL 600

Durable! This pump stands up under hard use. Hydraulic efficiency as high as 70%. Quickly installed by any shop man at little cost and easily moved from one job to another. Controlled flow—60 g.p.h. with $\frac{3}{4}$ " tubing to 1200 g.p.h. with 1" pipe. $\frac{1}{4}$ H.P. NEMA motor meets any demand with negligible current cost. Tank With Built-in Baffle. 12" x 12" heavy galvanized sheet iron with baffle separator to collect heavy chips. Painted machinery gray outside. Removable lid for cleaning without disconnecting return piping.

Write or wire today to:
BRADY-PENROD, INC., Muncie, Indiana, U.S.A.



ON A DRILL PRESS



PUMP AND TANK



ON A LATHE

SOLVED!

Your
WELDING
PROBLEM



We manufacture a complete line of **ELECTRIC SPOT WELDERS** from $\frac{1}{4}$ to 500 K. V. A. for welding:

- Brass
- Aluminum
- Bronze
- Stainless Steel
- Galvanized Sheets
- Monel
- Molybdenum
- Tantalum
- Nichrome
- Tin Plate
- Copper
- Nickel
- Silver
- Gold, etc.

There is an **EISLER WELDER** for every purpose.

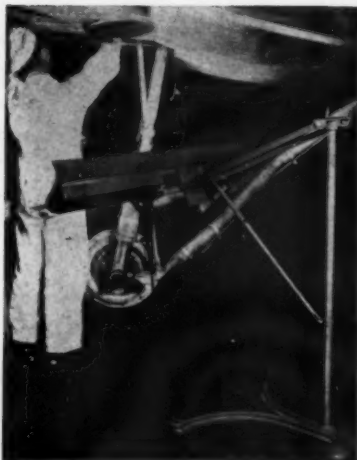
Butt Welders to weld from .010" to $\frac{1}{2}$ " dia. metal. We make all kinds of Standard & Special TRANSFORMERS A. C. ARC WELDERS—100 to 400 Amps. LARGE or SMALL QUANTITY CONTRACT SPOT WELDING.

**FOR INFORMATION
WRITE TO**

**CHAS. EISLER
EISLER ENGINEERING CO.**

762 So. 13 St. near Avon Ave., Newark, N. J.

Portable Fluorescent Light



Adjustable from 30" to 7' and designed to project light into many inaccessible places is a new portable fluorescent service light recently developed by Lumidor Mfg. Co., Los Angeles, Cal.

The Army first ordered the light for servicing planes at night, but it has been widely adopted by industrial plants. Aviation industries are said to use the device indoors to project light under wings and fuselages, areas, invariably in overhead lighting. Outdoors, it is easily portable (merely tipped and rolled on its casters) and throws illumination in any direction.

Upward or downward, horizontally or vertically, or in any angle of a 180° arc, the unit is adjustable without use of tools and is said to illuminate with a long source of cool, comfortable fluorescent light which permits close working arrangements and reduces shadows. A balanced cast iron base makes the light practically impossible to upset. Other features include power factor correction for two 48" 40-watt fluorescent lamps; high-baked enamel reflector; and, if desired, a screen can be supplied to protect the lens.

NO. 1 HEAVY DUTY GEARED HEAD HAND MILLER

Available with Longitudinal Power Feed to Table



Table 6"x24"
Capacity 5½"x8½"x18"

Gear'd Spindle
Speeds — 6 forward, 6 reverse.
Optional spindle
speed ranges
available. 150-
675 r. p. m.; 200-
900 r. p. m.; 350-
1350 r. p. m.

Anti-friction
speed and spindle
assemblies.

Built in coolant
pump and piping.
Motor in base.

**PROMPT
DELIVERIES**

ATLANTIC MACHINERY CORP.

149 BROADWAY,

NEW YORK, N. Y.

Salvage

Ashes taken from two process-steam boiler pits in the salvage department's shop are yielding critical materials at one of the General Electric Co. major works.

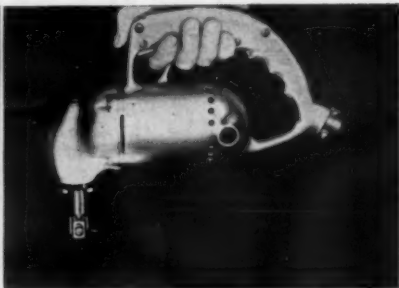
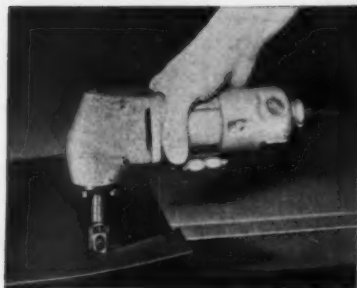
Shop refuse and rubbish from all parts of the works are used for fuel. Ashes removed from the boiler pits are passed thru a ball mill, or grinder; a magnetic separator, which separates the ferrous from the nonferrous met-

als; and a concentration table which sorts out the finer particles. Metals reclaimed by this method include iron, steel, brass, copper, and aluminum. In 1941 a total of 624,000 pounds was recovered, representing a gross cash return of \$10,000.

Other items, which in the past have been unsalvageable economically, are yielding critical materials in quantities that are worthwhile in these times. For example, the salvage department receives from the wire-drawing department a waste known as "copper and grease." It is taken from the pits under the wire-drawing machines and consists of a mixture of wire-drawing compound and fine copper particles. The wire-drawing compound is in liquid form, and contains water, soap and tallow which is

applied to the drawing dies for lubrication and cooling. This flows into a pit underneath the wire-drawing machine and carries with it fine pieces of copper. It is shoveled from the pit into steel drums and when the water and grease are removed, the copper remains in dry, hard chunks. Last year 88,200 pounds of copper reclaimed in this way were shipped out to the smelters and vendors for conversion into raw materials. Gross return: \$8,000.

Improved Models of Black & Decker Lectro-Shears



Both the 16 gauge and 18 gauge Lectro-Shear have been re-designed by the Black & Decker Mfg. Co., Towson, Maryland, to improve their ease of handling and operating characteristics.

The No. 18 Lectro-Shear has been reduced in outer dimensions, so that the motor housing forms a comfortable operating handle. This greatly reduces

the length and weight of this tool, and vastly improves the operating balance and control. Power and capacity of the tool are the same as in previous models, cutting up to No. 18 gauge sheet steel.

The larger No. 16 Lectro-Shear has been equipped with an improved operating handle which gives this tool better balance and easy control on curved and irregular lines. It is equipped with an instant release trigger switch, with locking pin for continuous operation. The handle is so shaped that it can be used over the tool or at the rear end. The power and capacity of this tool are the same as in previous models, cutting up to No. 16 gauge sheet steel.

LUMA

Combination
Etchtool —

— 3 —
Tools
in 1



Luma Marking and
Demagnetizing SIMULTANEOUSLY

Writes on hardened steel — demagnetizes at the same time—with carbon point does light spot annealing and soldering jobs. Compact—easy to use—dependable.

Send for details—5-day FREE TRIAL OFFER!

Luma Electric Equipment Co.
Dept. H—Main P. O. Box 132, Toledo, Ohio

Buy U. S. War Savings Bonds and Stamps

Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS



Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduces time and eliminates spoilage of other methods. 7 sizes U.S.S.—Inexpensive—last for years.

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**NIELSEN TOOL &
DIE COMPANY**
1859 Gardner Ave.
Berkley, Mich.

SPEEDS PRODUCTION! CUTS TIME AND COSTS!

SPEEDY AIR VISE

**FAST! POWERFUL!
FOOT CONTROLLED!**

Most important vise design in years! A fast-action, hard gripping air vise that speeds production; saves time, labor and costs! Speedy Air Vise operates from air line or individual compressor, exerting a grip of 15 times air pressure! Jaw opening adjustable up to a maximum of 3 inches. Maximum travel of $\frac{1}{2}$ inch assures rapid insertion and removal of work. Employs no piston, but instead a long-life, multiple-type diaphragm . . . eliminating friction loss, air leakage and slippage. Rugged, compact, low priced, it is the ideal vise for speeding up numerous operations.



\$24

HAND FREE OPERATION!

● Foot operation leaves BOTH hands free for fast insertion and removal of work. Vise stays open or closed without constant foot pressure.

Complete with Foot Control Valve, Air Hose and Fittings

Write at Once For Circular B-10

W. R. BROWN CORP., 5720 ARMITAGE AVE., CHICAGO, ILLINOIS

MODEL No. 16 "SPECIAL"

CONSTRUCTED AS PER SPECIFICATIONS OF U. S. NAVAL AIRCRAFT FACTORIES

BUTTERFLY FILING and SAWING MACHINE

(Die Making Machine)

This is a very heavy, powerful machine and is designed for extra heavy filing and sawing, but it performs small work just as well. This type of machine is usually adopted in Ammunition Plants, Airplane Factories and machine shops where heavy and precision filing and sawing is desired. We also manufacture smaller models—Model D-10" Table; Model E.L. 12" Table.

HARVEY MFG. CORP.

161 GRAND ST., NEW YORK

Phone Canal 6-5170

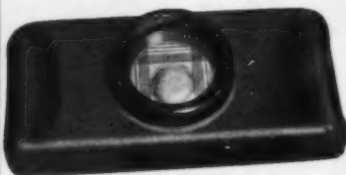


BEWARE OF IMITATIONS!

Our machine carries the Butterfly trade mark.

Registered U. S. Patent Office

FELL PRECISION LEVEL



A precision "all-way" level for use in machine tool building, setting up and maintenance, whether for establishment of level working surfaces or for the accurate checking of straightness where true level itself is not required.

Graduations are in .0005" per foot and form squares about a circular bubble, thus giving coordinate readings and showing the direction and amount of slope, if any. Made in two sizes—5¼"x12"; 3¼"x6".

Write **TODAY** for
bulletin giving full details.

Wm. B. FELL COMPANY
700 South St. Rockford, Ill.

DROP FORGED CLAMPS



Extra Strong—Longer Life

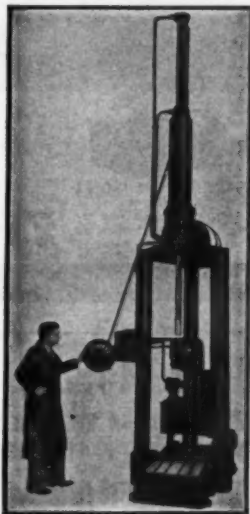
Products Engineering Company's quick acting jig clamps are the only drop forged clamps available—they're stronger—they have exceptional opening and closing speed and a positive lock impervious to pressure and vibrations—it pays to specify them. Available in many models and sizes from midget to 6" clamping bars. Send today for file size catalog.

PRODUCTS ENGINEERING CO.

700 E. FLORENCE AVE., LOS ANGELES, CALIF.

Automotive Honing And Lapping Machine

Designed for honing cylinders up to 24" diam, with 20 to 72" strokes, this machine, when used with any standard honing head, will produce accurate, straight, round, smooth bores, according to the builder Automotive Maintenance Machinery Co. 2106 Commonwealth Ave., North Chicago, Ill.



It is a production machine, said to be very flexible as to spindle speeds and reciprocation, to assure fast removal of material by honing, in a wide range of work: engine cylinders, supercharger parts, gun barrels, landing-gear struts, recuperator cylinders, etc. The machine is available in 4 standard models, with stroke up to 72" and with any distance under spindle nose to suit requirements.

All controls are at the front. Stroke-setting, hone withdrawal, short-stroking at any point, speed changes in rotation or reciprocation are conveniently governed from operator's position.

Available at extra cost is a positive

stop and dwell system by means of which spindle can be stopped without shock or impact at bottom of each stroke, at any point within stroke-range, holding spindle at that point, without reciprocation up to 1½ minutes, said to be a great aid in blind hole honing and straight line lapping or honing.

Detailed pamphlet issued by the firm gives all data on all models.

Huge Norton Grinders

In envisioning Victory, Norton Co., Worcester, Mass., is designing heavy ordnance grinders, now being built for 1942 delivery, for ready adaptation to finishing of crowned rolls, in peacetime.

In a beautiful, colored folder, 25½x 11", it pictures one of these grinding machines, having 40' capacity between centers. Under construction, states the folder, is another machine of this type with capacity of 68'.

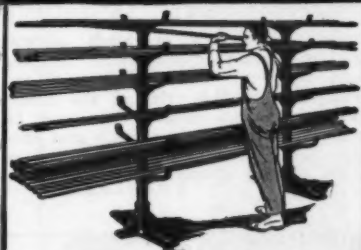
Featured in the machines are: all V-belt headstocks which, with motor, weigh 8 tons; exceptionally long wheel carriages, on which grinding wheel

head, control and pushbutton panels and carriage traverse mechanism are mounted. From operator's position on wheel carriage, action of grinding wheel on work can easily be observed. All controls are within easy reach from this position. These include motor-driven swivel adjustment with vernier scale, enabling quick, accurate taper-settings to be made.

Provision has been made so the roll crowning mechanism can be added, later, for peacetime conversion. Claimed for the crowning device are 1-Concave or convex rolls can be ground, simply by changing cams . . . said to be easier than changing a tire. 2-Once set, same crown is produced on all rolls thereafter, with accuracy. 3-To readjust for amount of crown takes but a few seconds, 4-Crown produced is a true deflection curve, objective in most rolling mills.

Contained, also, in the folder are full specifications of the machines. These, by their large size and massiveness convey the impressive hugeness of these grinders.

A TIME SAVER



The BROWN SECTIONAL RACK

saves the time wasted end-hauling stock from the old-style, closed-side rack and quickens the selection of sizes by greater visibility. Built of standard metal sections: can be expanded for changes in stock or growth of business. Made in 5 styles: can't burn, depreciation practically nil.

SEND FOR BULLETIN No. 26-B

BROWN 126 N. THIRD ST.
ENGINEERING CO. READING PA

New Britain UNIVERSAL VISE

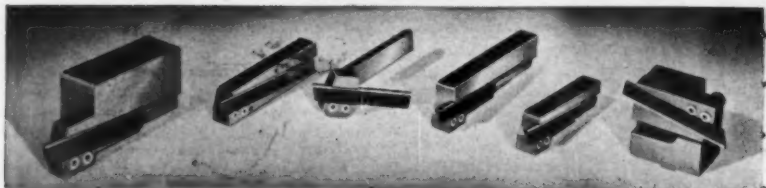
Swivels 360 degrees horizontally,
100 degrees vertically, to
give any angle or com-
pound of
angles.



Write for
Further
Information.

NEW BRITAIN TOOL & MFG. CO.
NEW BRITAIN, CONN., U. S. A.

Luers Blade Holder



Empire Tool Company, 8782 Grinnel Ave., Detroit, announces introduction of 6 new tool holders designed for accommodation of Luers patented cutting-off blades on 6 additional types of screw machines.

Their development broadens use of Luers blades, already extensive, to include adaptability on the following makes of machines: Greenlee 4- and 6-spindle Automatics, New Britain Automatics, all lathe and hand screw machines with round posts, Acme-

Gridley R and RA Series, and Gridley Models F and G Multiple Spindle Automatics.

The Luers Holders are unique in design and construction and claim features said to step up efficiency in cutting-off operations.

One of them is ease, speed, and simplicity with which a cutting-off tool can be set up in machine and the facility with which an operator can remove blade for resharping and later replace it, precisely in original position, without disturbing the set-up.

The Luers blade is held in place as securely and rigidly as any forged blade by means of 2 unique cams which force top surface of blade against ground surface of holder to provide solid bearing. Altho capable of exerting a bull-dog grip on the blade, locking device, nevertheless, can be made to release blade quickly and simply. Initial setting and re-setting of blade is very simple.



FOR REMOVING BROKEN TAPS

Quickly—
Insert WALTON Tap Extractor and back out broken piece. No annealing—no drilling.

Easily—
Tap Extractor and Tap Wrench are only tools needed.

Safely—
Threads are not damaged. Not necessary to tap oversize after broken tap is removed.

Folder 131 gives complete details.

The Walton Co. 95 ALLYN STREET, HARTFORD, CONN.

ACROMARK FAST

TRADE MARK

MARKING & NUMBERING MACHINES HELP YOU DO A GOOD MARKING JOB.

Write for latest catalog.

CONSULT OUR MARKING SPECIALISTS ABOUT ANY MARKING PROBLEM.

THE ACROMARK CORPORATION
915 Marrett St.
Elizabeth, N. J.



FLEXIBLE STEEL TUBING



The recognized standard for use on Milling Machines, Automatic Screw Machines, Turret Lathes, and other Machine Tools.

Adapted for all purposes for conveying cutting oil and other liquids. Manufactured in sizes from 1/8" to 1/2" inside diameters.

Write for
bulletin No. 637

T. R. ALMOND MFG. CO.

**ASHBURNHAM,
MASS.**



**PROMPT
DELIVERY**

*Few
Territories
Available.*

Dyer Welders are available in a wide range of sizes and capacities—air, motor or foot operated, giving maximum production—simplicity of operation—power economy.



Heavy Duty Spot Welders

Floor models
10 to 35 KVA.

6 point selective switch on all floor models allows for quality welds on various materials. Standard and Underwriters Labeled Machines.

3 point switch on bench models.

Bench models 2½ to 10 KVA—with or without pedestal.



300-322
Jackson St.

THE TOPEKA FOUNDRY & IRON WORKS CO.,

**Topeka,
Kansas**

NEW LOW COST DRILL GRINDER

Anyone can do expert drill grinding with this simple-to-use drill grinding attachment—fits on any bench grinder—saves buying new twist drills—saves time



and materials that dull bits waste. Grinds bits from 3/16 to 1 1/4. Write for FREE literature.

T & H MFG. CO.
811 E. 31 St.
Kansas City, Mo.



For Machine and Tool Work & Quick Set-Ups

The only 3-way reading precision indicator. Accurate in either direction. Feeler mounted in centered cone bearings. .014 reading.

Price \$5.00 plus postage Write for folder.

J. R. Reich Manufacturing Co.
45 E. Stroop Rd., Dayton, Ohio

An ingenious arrangement on locking wrench serves as blade-setting gauge and provides efficient means for accurately resetting blade after re-sharpening.

Ajax Floating Holders

The Ajax Engineering & Mfg. Co., 14230 Birwood Ave., Detroit, Mich., announce a new Floating Holder of the B. & S. type, furnished in the latter's following numbers:—B & S No. 00, B & S No. 10, B & S No. 12, and B & S No. 14. It is said these holders are made of a special alloy that has been tested and proven to stand the stress in use on screw machines.

Ajax have increased their production facilities to meet wartime demands, and immediate delivery is possible at this time.

They maintain a 30-man engineering staff that will be glad to discuss problems in connection with floating holders.



Anderson HAND SCRAPERS

Three sizes with attachable blades 1/16" thick. Blades, tested for proper hardness stand up under hard usage. One Anderson blade is equal to an ordinary hand scraper reforged about 5 times. When worn out a new blade makes a new scraper. Making scrapers from old files is too costly; hand made and forged scrapers cost three to five times more. No need to grind an Anderson Blade ... stoning is all that is required. Blade cuts faster, lasts longer and saves grinding time. Blades purchased by the dozen cost only about one-tenth the cost of making one by hand.

Write for complete information.

ANDERSON BROS. MFG. CO.,

1917 Kishwaukee St., Rockford, Ill.



REID *Hand Feed* SURFACE GRINDER

Head elevating hand wheel is beside table feed hand wheels for ease of operation without loss of motion.

Grinds work 18" long, 6" wide and 11" high with a 7" diameter wheel. Work table is 51" x 8" with working surface of 18" x 6". Write for folder.

Exclusive Selling Agents

**H. LEACH
MACHINERY CO.**

387 Charles St., Providence, R. I.

**TOP
RIM**

STACKING BOXES



**FOUR STOCK
SIZES.**

Orderly storage of parts in convenient, all-welded, stack boxes saves valuable production time.

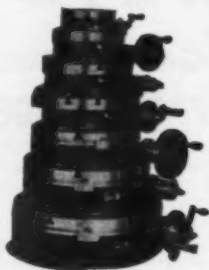


Bench legs of 14 ga. channel iron, all-welded joints. May we quote on your standard or special requirements.

STERLING
FACTORY EQUIPMENT CO

183 CHARLES ST.
PROVIDENCE, R. I.

TROYKE ROTARY TABLES



Sizes 9', 12', 15' and 18'.

Ask your dealer or write us for
eight page catalog.

ALFRED A. TROYKE

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NIELSEN Heavy Duty

*Live
Centers*

*Write for
catalog on
live centers*

Adapted
for heavy
duty work.
Precision type
ball and roller
bearings assure
maximum capac-
ity for high speed
production and long
service.

NIELSEN, INC.

LAWTON,
MICH.

Tandem Timer



The "Tandem Timer" is a new timing device presenting unusually versatile features of particular value in production departments, laboratories, and for life testing of electrical apparatus. It is made by Industrial Timer Corp., 113 Edison Place, Newark, N. J., and permits practically any timing sequence that may be desired. It is essentially a control unit with 2 individual and variable plug-in type timing elements. With the timing elements adjusted to their correct respective time intervals, each cycle of operation will follow the other continuously in regular sequence. When the timer dials are once set at the time interval desired, further adjustments are unnecessary until a new sequence is required. The automatic reset features of the "Tandem Timer" makes a continuous, as well as a single cycle of operation possible. Plugging in of different timing elements is accomplished in a matter of seconds.

Six standard models are available, offering settings from $\frac{1}{4}$ second to 2 hours 45 minutes. Longer cycles are built to specification.

CUTS GRINDING COSTS

$\frac{1}{2}$ — $\frac{3}{4}$ —and MORE



HEAVY DUTY

3 Phase
60 Cycle
No Brushes

GASTON POWER TOOLS

2655 W. 95th St.,

Evergreen Pk. III.



Industry's Newest Tool . . .

MEAD BANDSANDER

It is a time, labor and money saver on innumerable jobs in any shop. Sharpens tools, cutters, etc., of many "kinds". F. O. B. Chicago, \$14.95.

MEAD SPECIALTIES CO.

15 S. MARKET ST. DEPT. 19-Y CHICAGO, ILL.

WATER removed from AIRLINES AUTOMATICALLY WITH THE MURPHY SEPARATOR



Sizes $\frac{1}{2}$ " to 4" Pipe

Literature and Prices on request.

RESULTS — — — GUARANTEED

NO ABSORBENTS — NO CHEMICALS

JAS. A. MURPHY & CO.

HAMILTON, OHIO

More Speed

WITH THE NEW



CARDINAL MACHINE COMPANY

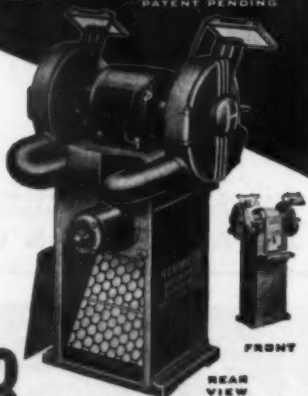
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GLENDALE, CALIFORNIA

"The -SPEED VISE- Manufacturer"

Hammond OF KALAMAZOO NO-DUST* GRINDERS

PATENT PENDING



3 POPULAR SIZES
FOR 10" 12" 14" WHEELS

*COMPLETELY SELF-CONTAINED
GRINDER AND DUST COLLECTOR

SAVE SPACE—Only 6½ sq. ft. where
average grinder and independent dust
collector take almost 15½ sq. ft.

SAVE TIME—Set up anywhere near
electrical outlet and put it to work.

SAVE "MAN-HOURS"—Protect health,
keep 'em working.



WRITE FOR
BULLETIN GP-13

Hammond
Machinery Builders
INC.

1814 DOUGLAS AVENUE, KALAMAZOO, MICHIGAN

Charts Victory

No graph of any American activity better forecasts doom of the Axis than this one of machine tool production, appearing in a recent issue of "Machine Tools," organ of NMTBA, Cleveland. The rate at which the nation's machine tool industry has been accelerating machine tool production staggers the imagination, states the lead article, "Machine Tool Output Charts Victory." Last year, production reached \$775,000,000, an all-time high. In the first 6 months of this year, says NMTBA, production averaged more than 1½ that for the corresponding period of last year.



Illustrated articles, on women manning machine tools and auto plants tooled up for war production, portray the significant part played by the industry in furthering America's victory-bound war effort.



—and keeping 'em going has never been more important than it is today. Gits Oil Cups and Lubricating Devices, of every description, are answering the Call of the Colors with a proved-in-service reputation established thru more than 30 years of service to industry. Catalog No. 60, gives you 172 pages of answers to lubricating problems.

GITS BROS. MFG. CO.

1860 South Kilbourn Ave.

Chicago, Ill.

30 years of oil cup experience

Fluorescent Light Care

Critical materials are required in the manufacture of ballasts and starters, essential to the operation of fluorescent lamps. Because replacements are difficult to obtain, proper maintenance of fluorescent equipment is extremely important these days as a conservation measure, says Edison Industrial News.

At the first indication that a lamp is not operating properly turn it off im-

mediately and have the fixture checked by a maintenance man. When a lamp blinks on and off for a considerable time, there is usually something wrong. If allowed to continue, the starter may be damaged, ballast injured or life of the lamp reduced.

Fluorescent lamps, like incandescent bulbs, have a rated average life. For 40- and 100-watt fluorescent lamps, sizes commonly used in factories, average life is 2,500 and 3,000 hours respectively.

In general average life can be affected by the number of times a lamp is turned on and off. The coating or activating material on the electrodes is dissipated much faster when the lamp starts than during normal operation. When used up, the lamp blinks off and on and hot electrodes frequently create a deep orange glow at the ends of the tube.

During normal life, a fluorescent lamp has a tendency to blacken. However, discoloration should

not be noticeable during the first 500 hours of operation. Near the end of its life a lamp usually blackens at either end. Dark rings may also appear about 2 inches from base of tube. Improper starting may have some effect in producing these rings, but they are usually a natural development. Should a dense black spot appear early in the life of a lamp, very often it indicates high circuit voltage.

THREADWELL DOES IT!

THREADWELL LICKS TOUGH THREADING JOBS MAKING "FULL FORM" BRITISH TAPS

Many American industries are working on orders for Great Britain where British form of thread is required. Here at Threadwell all Whitworth, British Standard Fine and British Association High Speed Taps as small as No. 10 B.A. are ground with a true "Full Form".

For long life and accuracy these taps are unsurpassed. Their manufacture requires the highest standards of workmanship and the most modern equipment. Threadwell has both -- and will continue to turn out these "Taps of Distinction" in an all-out effort for final victory.

THREADWELL TAP & DIE COMPANY
Greenfield, Massachusetts, U. S. A.



Rotary Hack Saw

The Rotary, made by Misener Mfg. Co., Inc., Syracuse, N. Y., is said by the maker to cut clean and finished round holes in steel, sheet metals cast iron, slate, wood, plastic, fibre and Bakelite. With use of abrasives, it is claimed the saw will cut marble, tile and porcelains.



The saw cuts circles thru wood up to 2 1/2" thickness, according to the maker.

It is said to increase the range of a 1/2" electric drill to 3 1/2", and a 3/4" to 7". Types are available for both electric drive and for use with bit-brace. Blades are semi-highspeed type, 1" in depth, with others ranging in depth from 1/2 to 2 3/4". Cuts are made 1/4" less in depth, as 1/4" is taken up by body of the tool. Special diam. saws can be had to specifications singly or in quantity.

The firm offers literature containing full details and specifications to interested parties.

Productimeters Catalog

Titled, Speedometers of Industry, Bulletin No. 100, newly released by Durant Mfg. Co., 1229 N. Buffem St., Milwaukee, displays a wide range of applications in which its counting devices are used to aid production control in modern plants. Among such are applications on can-sealing machines, turret lathes, punch presses, drill presses, wire-measuring, and others.

The firm makes varieties and models of counting devices and tachometers said to meet almost any possible counting problem. Types range from hand-operated to devices actuated by photo-electrical control. Listed, also, are some 28 representatives and distributors in as many American cities as well as in Australia.

AMIC Comparator



This modern instrument is designed for accurate, convenient and quick checking of components, either in the tool room or on the production line—permitting precise gaging throughout the whole day without eye fatigue. Each small line on the scale represents 1/10,000th of an inch.

A Remarkable Improvement

Clear reading is provided on the 6" large scale, with inch and millimeter readings. Magnification is 1000.

Measuring capacity is plus or minus .003" and plus or minus .05 mm.

Pointer immediately comes to rest.

Pointer moves in the plane of the scale, thus avoiding any error in measuring due to parallel axis.

Provision is made for convenient lifting of the measuring pin.

Two fine adjustments assure easy setting.

Convenient red mark limit hands control the tolerance required.

Interchangeable backstops and accessories.

Our longstanding experience is at your disposal. Consult us regarding your measuring problems—we will solve them.

AMERICAN MEASURING INSTRUMENTS CORPORATION

40 WEST 22nd ST.,

NEW YORK, N. Y.



Blast 'em with the Diamond-U Blow Gun!

Here's the Blow Gun with which the operator can apply the softest puff of air or full airline pressure blast to his work, with **POSITIVE CONTROL**. Beautifully balanced, feather-light, it also has the enduring stamina for war production lines. A long time favorite in the automotive field, the "212" is winning "E"s in aircraft and other plants the country over. It's available only on an A1-J or better rating. Order from your Jobber...and buy War Bonds!

SERVICE EQUIPMENT COMPANY
MANUFACTURERS SOUTH GATE, CALIFORNIA



Uses of Cork

Among the many highly interesting uses for cork, one that is perhaps less known than many of the others is that of sandwiching in a light layer of cork composition between parts being assembled, when one or more of the parts is particularly susceptible to shock, breakage, or fluid leakage. A case in point is found where glass or porcelain must be assembled to metal. Cork is compressible to a considerable degree, and yet it has a continually enduring resiliency.

cork must be applied, and show considerable tensile strength, the required strength is given by reinforcing layers of cork with layers of fabric. The same circular knives mentioned as suitable for cutting cork, are also recommended for cutting fabric, and in consequence this happy combination may be cut with the same tools.

**Buy U. S. War Savings Bonds
and Stamps**

Therefore, under relatively light pressure in the assembling operation, thru whatever fastening devices may be used, cork compresses sufficiently to hold the parts firmly in their relative positions, and is an ever-present shock absorber to prevent breakage, at the time of assembly and afterward.

Gasoline, oil or greases have no destructive influences on cork that are worthy of mention. Since cork is not subject to progressive deterioration, it will usually last for the full lifetime of the mechanism or the equipment to which it is applied. Circular knives for cutting cork and similar materials are made by some of our outstanding circular saw manufacturers. In cases where



SPEED AND ACCURACY

Accurate, economical lapping of holes is rapidly accomplished with Copper Head Laps. All wear is confined to the copper sleeves which are replaceable. When worn these sleeves are quickly removed and new ones, accurately sized, are substituted; an economical feature found only in Copper Head Laps. Carried in stock in sizes from $\frac{1}{8}$ " to $2\frac{1}{4}$ ".

BOYAR-SCHULTZ CORPORATION

2108-K Walnut Street

CHICAGO, ILLINOIS

Flat Spray Nozzles

Chain Belt Company has issued a new illustrated folder describing its Rex Spray Nozzles. Illustrations of this ingenious device in the folder show various uses which range from cooling fruit in packing plants and cleaning trolley busses in garages to washing logs in lumber mills or descaling sheets and plates in steel mills.

The nozzle itself is described as a non-clogging device which throws a flat, fan-like, hard-hitting spray with such force that it removes dirt and grit from the most irregular surfaces. The high velocity spray is so concentrated that it produces an extremely thin line of impact which amounts to a sharp cutting action. The device was originally developed for cleaning traveling water screens and because of its unusual effectiveness has since been adapted to many other purposes. The folder is known as Bulletin No. 409.

Hobart Paper Has Pep

No easy matter, is the job of providing a house-organ that clicks on all counts: interest, informativeness, value to firm and employee. Hobart Arc Welding News, by Hobart Brothers, Troy, O., achieves this enviable objective. Whether seasoned welder or war-fledged neophyte, the magazine holds meaty matter for all . . . all the way from detailing intricate applications of welding to war-production needs, to making your own farm trailer or electric lawn-mower, entirely by welding. There's even a story of building a fire-proof gas station by welding scrap pipe for the frame and covering with sheet metal. This in the case of one who suffered 5 previous fires, to the grand total of \$68,000 and who decided upon the unique construction as a final resort.

It's a publication that every welder, present or prospective, will find valuable.



Angle Plates for, Boring Mills, Drills, Grinders, Layout, Inspectors, Surface and Lapping Plates, Prompt Delivery.

TATRA TOOL CO.
16317 Sanford Ave. - Cleveland, O.



BAUMBACH
STANDARDIZED
Machined Steel DIE SETS Semi-Steel
Drop Forged Steel

Headquarters for Standardized Die Sets, embodying many exclusive features and embracing more than 195,000 stock sizes and 46 different styles. A die service that is unsurpassed. Let us prove it!

Send for our new 336 Page Catalog.

E. A. BAUMBACH MFG. CO.
1810 So. Kilbourne Ave., CHICAGO, ILL.

Screw Products Catalog
Manufacturers Screw Products, 296Y West Hubbard St., Chicago, announce publication of a somewhat revolutionary Screw Products catalog, 96 pages and cover, in which all items conform to the revised suggested stock size lists, as per the maximum price regulation No. 147 of the O.P.A.



The book is exceptional in its coverage of the Screw Products Industry, and in the manner in which it is sectionalized for easy reference, with one complete and 12 sectional indexes. The catalog contains not only list prices, but also complete technical data, giving weights and dimensions of various products. It features, for example, one entire section devoted exclusively to AN products for the Aviation Industry.

The book is supplied gratis to any engineer or purchasing agent who will write for it on his business letterhead.

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CLOSED

TRADE **AUTOM** MARK

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CONTINUOUS HINGES

THREE-FOURTHS OFFSET.

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AUTO MOULDING & MFG. CO.

2326 S. CANAL ST
CHICAGO

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OPEN

Offset Type

SPECIFICATIONS:
Open Width $\frac{1}{8}$ " to 6"
Gage Material .040 to .125
Pin Diameter .101 to $\frac{3}{16}$ "
Lengths to 120"

SEMI-OFFSET

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OPEN

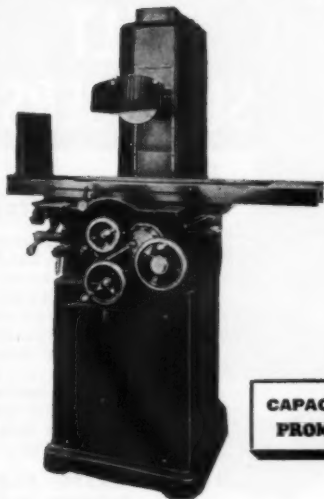


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ATLANTIC

No. 2 Automatic Precision Type SURFACE GRINDER



ANTI-FRICTION
POPE—S.K.F.
SELF-CONTAINED
SPINDLE

CAPACITY 6' x 12' x 18'
PROMPT DELIVERIES

ATLANTIC MACHINERY CORP.
149 BROADWAY, NEW YORK, N. Y.

Man Made Weather

Engines for airplanes of the future are constantly being tested by the Army Air Force to determine performance at different altitudes, temperatures, and humidities. They are tested not only at altitudes as high as 40,000 feet, where temperatures drop to -67 F and where air pressure falls to 5.54 inches of mercury (absolute), but also at low altitudes over deserts, where the temperature soars to 120 F,

ity, temperature, and pressure for the particular condition desired, and then delivered to the engine carburetors.

If air of extremely low humidity is desired, it will first be dropped in temperature to a point as low as -70 F to condense out the vapor, which will separate from the air in the form of snow or frost. The dried air will then be reheated to the proper temperature by G-E finned Calrod heaters before being delivered to the carburetors.

the relative humidity amounts to only 5 to 10 per cent, and the pressure may rise to over 29 inches of mercury.

Engines undergoing test never leave the ground, but meet these extremes of atmospheric condition in Army Air Force laboratories, where refrigeration equipment, electric heaters, and evacuating equipment are taking over for the elements.

Such a laboratory will soon be put into operation in the United States. It will house several test chambers, all of which will be testing engines under different conditions. To accomplish this, air will be partly conditioned and then delivered to the various test chambers by a 250-horsepower blower. At each test chamber the air will be further conditioned to obtain exact humid-

Mechanics' Handbook

The 4th Edition of the Practical Mechanics Handbook with 390 illustrations, by F. J. Camm is a handy reference volume for mechanics, engineers and draftsmen. It is published by Chemical Publishing Co., Inc., 234 King St., Brooklyn, N. Y., and the list price is \$4.

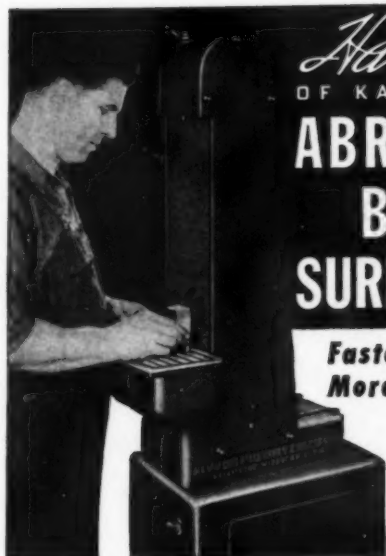
A decidedly helpful feature is the cross-referenced index, facilitating the tracing of tables, data or information.

The initial chapter on Mensuration leads into Powers and Roots of Useful Factors and Trigonometrical Functions followed by discussions of the Metric System and English Weights and Measures.

Principles of Mechanical Drawing are next considered with a section on blueprint reading, etc., all clearly detailed.

Swinging into Shop Practice, is an interesting description of the use, of Micrometer and Vernier, followed by chapters on Drills and Drilling; Special Cutters; Reamers; Other Cutters; Small Taps, Dies, etc., Files and Filing and Marking Out for Machining.

Lathe Tools and Tool Angles; Turning Between Centers, Boring and Screw Cutting are next considered.

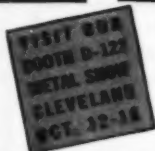


Hammond OF KALAMAZOO ABRASIVE BELT SURFACERS

**Faster . . .
More Economical**

Speed and precision by hand operation on the "600" offers greater savings in fixture expense and set-up time. Universal in scope of materials handled, the "600" is a great production aid.

**WRITE FOR
BULLETIN GP-7**



Model 400 Dri

Hammond Machinery Builders, Inc.

1815 DOUGLAS AVENUE • KALAMAZOO • MICHIGAN
LANSING BRANCH • 1825 1/2 E. 10TH AVE. • 48201

These subjects are followed by a discussion of Lathe Equipment; Lathe Centers; Lathe Tool Bits; Grinding Operations and Grinding in the Lathe. Dividing Heads and Gears are explained in clear concise style and amply informative detail.

Considerable useful information is given on Soldering and Brazing; Laps and Lapping; Clamping Work on Machines; Riveting; Polishing and Finishing Metal, making the work a worthy addition to shop and office files.

Plants for Subcontract Work

HERE are additional plants with machine tool capacity available for subcontract work. Code numbers are used in lieu of names for obvious reasons. Addresses are at all times available for Government Officials, prime contractors and responsible manufacturers.

Address all communications to Subcontract Dept., Hitchcock Publishing Co., 508 S. Dearborn St., Chicago, Ill. (Phone HARRISON 6040).

If you have any idle tools in your plant, send a description of your plant and list of tools for listing. It is a patriotic duty for every plant to respond to Donald Nelson's appeal for additional subcontract capacity. There are no charges or obligations involved in connection with listing your subcontract facilities in **THE BLUE BOOK**. It is our gratuitous contribution to help speed the American All-Out Victory Program:

H-48—Tool and Machine Works in Massachusetts offers for subcontract work the following LATHES:—P&W 12"x5"; Rockford 16"x5"; Reed-Prentice 12"x4", 16"x10", 12"x8"; Lodge & Davis 16"x5"; 4 Atlas 10"x24"; South Bend 9" bench and 2 Porter-Cable Production lathes. TURRET LATHES:—2 Garvin No. 2-1" cap.; P&W No. 1 1/2-1"; 2 P&W No. 2-1" and No. 4-1 1/2" W. & S. MILLING MACHINES:—Van Norman 22LU fully equipped; B&S No. 2 universal; Kempsmith No. 3 plain; Bridgeport vertical; Becker No. 2 1/2 plain; B&S No. 1 plain; Garvin No. 2 plain and Whitney No. 6 hand miller. GRINDERS:—B&S No. 1 universal; Van Norman No. 2 universal; P. & W. internal; Reid No. 2 6x18" surface; Robot 6x18" surface; LeBlond No. 1 universal cutter grinder; Cincinnati universal cutter grinder; Cochrane-Bly cutter grinder; Ex-Cell-O carbide tool grinder; DRILL PRESSES:—Allen 16" ss; 2 Atlas 14" ss; W. K. Knight No. 1 precision; Allen 16" 2-spindle; Prentice 20" ss hd; 2 Allen 2-spindle; Prentice 3-spindle; 2 Delta ss; Dwight-Slate 2-spindle; Leland-Gifford 4-spindle; Prentice heavy duty ss; Barnes heavy duty ss; 2 Tuttle 1 1/2" tapping machines. SHAPERS:—Whitcomb 24" and P & W 14".

PLANERS:—Whitcomb 16x36"; P & W 14x36" and Shepard 24x72". MISCELLANEOUS:—2 No. 8 Standard presses; No. 1 Lapointe broaching machine; Doall contour saw; 2 Kalamazoo band saws; Cochrane-Bly cut-off saw; Economy heat treating furnace and a complete inspection Dept.

H-47—Connecticut plant has following available:—South Bend 9" bench lathe; 2 Atlas 10" bench lathes; Prentice 14" engine lathe 6' bed; Atlas drill press and Van Norman cylindrical grinder. Owner has had 10-years' experience making jigs and fixtures and is capable of reading complicated blueprints, estimating costs, setting up, etc.

H-46—Designers and builders of special machinery, tools and dies in New Jersey with facilities for pressed sheet metal, wire and screw machine products, have the following equipment available for subcontract work:—20 lathes, maximum capacity 24" swing x 24" overall; 28" swing x 10' overall; the rest vary to a minimum swing of 12"x3" between centers, including 3 new bench lathes; 5 millers including Cincinnati plain No. 2, Cincinnati universal No. 3, Garvin universal No. 1 1/2, Becker-Brainerd plain, Bridgeport vertical turret head miller with attachments (slotting, etc.); 4 shapers—2 of 14" stroke, 1 each 15" and 16" strokes; 2 planers, Whitcomb 36" between ways, 26" clearance, 10' table, 22" between ways, 18" clearance x 5' table; new M3 Abrasive surface grinder; Norton universal grinder for internal and external work; Dumore toolpost grinder with quills and attachments; Niles-Bement No. 346 horizontal boring mill—bores up to 8"—52" travel; Doall contour saw model ML; 15 drill press including new Delta 2-spindle and 2 radials with 3' arm; complete welding department; metal stamping department with 4 power presses equipped with automatic feeds; supplemental machine shop equipment including filing machines, power saws; full complement of precision measuring instruments to work to tolerances of .0002". On order for prompt delivery, Carroll-Jamieson 16" geared head screw cutting engine lathe, 10' bed.

H-45—Texas Service Parts Plant now engaged on some A-1-A work has some additional works available on the following machines:—Landis 16 x 38" and 12 x 38" external cylindrical grinders (tolerance .0002"); Heald Model 50—18" spindle internal grinder (tolerance .0005") and Van Norman 8 x 24" external grinder (new—tolerance .0002"). No lathe facilities. Can do a real job on the equipment listed, and the management is eager to deliver.



"CHAMPION" Steel Racks

Save time, steps and money by keeping bar stock, shafting and pipe out of the way and off the floor.

Write for full details.

**The Western
Tool & Mfg. Co.**
Springfield, Ohio



The Standard of **QUALITY**

All standard sizes carried in stock for immediate delivery. Special cutters made to Blue Print.

As Cutter Specialists since 1919 we are able to offer the highest *quality* and *service* at *attractive prices*.

Write today for prices.

Few Territories Open.

QUALITY TOOL WORKS
Market St., Waukegan, Illinois

Reducing Absenteeism

Executives, labor-management committees and plant medical staffs are recognizing the importance of health and physical fitness programs in an effort to reduce absenteeism among industrial workers.

An effective means adopted by some of the nation's largest plants to combat such absence is the distribution of vitamins in capsule form to plant employees.

It is reported that not only has absenteeism been curtailed by the use of vitamins, but in many cases increased production efficiency has been accomplished. A large manufacturing plant, for example, suffered a relatively high percentage of rejections of parts and examined its workmen for vitamin deficiency. Specific treatment over a period of several months resulted in a reduction of as much as 75% in the number of pieces rejected. For one person, the average percentage of rejections was 1.7% prior to treatment. Four months later it had dropped to 0.2%. The workmen also reported much greater eye comfort, and in many instances were improved in general health.

Hermetically sealed capsules containing the daily requirement of all known vitamins necessary to maintain normal health are recommended for industrial use. These are packaged in bottles of 100, or in bulk containers with larger quantities. Full information regarding the use of vitamins in industry may be obtained by writing Cincinnati Vitamin Co., 1511 Madison Road, Cincinnati, Ohio.

SUPERIOR QUALITY AND WORKMANSHIP IN PLUNKET VISES



SQUARE BASE SHAPER VISE

The Shaper Vise has graduated swivel base and tongue in center to fit slot in table, and has holes for bolting down. In ordering this vise give size of slots in Shaper Table, also distance from center to center of slots.

No. 48, 18" jaws, 2 1/2" deep, opens 8 1/2". Weight 125 lbs. **\$52.00**
No. 4, 6" jaws, 1 1/2" deep, opens 5". Weight 45 lbs. **\$38.00**

Our complete line includes Vises for Drill Presses, Milling Machines, Shapers and Grinders.

Prices are net, f. o. b. Chicago. Write for illustrated folder today. Dealers inquiries solicited.

J.E. Plunket Machine Co. 1823 W. Lake St.
Chicago, Illinois

WILLEY'S

GENERAL PURPOSE TUNGSTEN CARBIDE TOOLS

You can handle 90% of your requirements with Willey's General Purpose Tungsten Carbide Tools, which are suitable for machining cast iron, tough hard rubber, bakelite, fibre and tough alloy steels.

Willey's General Purpose Tools give you low prices, increased production and lower operating costs. **Prompt deliveries** on these standard tools.

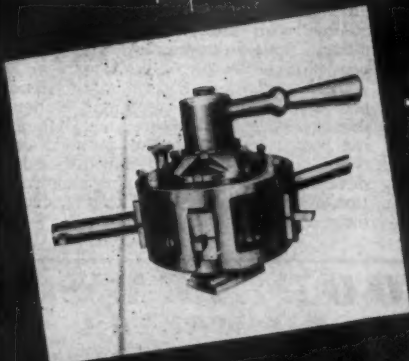


NEW CATALOG JUST OUT. WRITE TODAY!

WILLEY'S CARBIDE TOOL CO.

1340 W. Vernor Highway.

Detroit, Michigan



5 Station LATHE TURRET

Turret Head Body is of semi steel accurately machined and of ample strength to insure long life. The Index Pin of hardened steel is easily operated by lifting the knurled knob at top of Turret Body. Center Post of very heavy construction and equipped with lock nut, flatted to allow for a solid connection to the top of compound. Index Plate equipped with ten stops allowing for ten different tool settings.

AUTOMATIC MACHINE AND TOOL

132 CHARLES ST. COMPANY AUBURNDALE, MASS.

**WRITE FOR FOLDER GIVING
COMPLETE DETAILS**



CUB

VARIABLE SPEED TRANSMISSION

For "A" section V-belts—3.3—1 speed range—perfect belt alignment in all positions. Priced so low that no shop or machine need go without infinite speed selection. See your dealer or write **\$16.50** (3 Types—8 sizes to choose from)

Standard Transmission Equipment Co.
3409 VERDUGO ROAD LOS ANGELES, CALIF.

YOUR FIRST LINE OF DEFENSE against

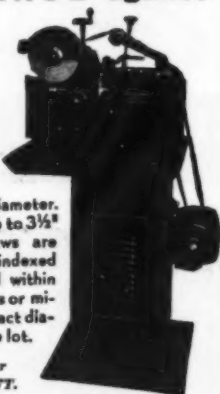
HIGH SHARPENING COSTS

No. 57T

Automatically Sharpens Metal Saws in gangs

up to 8" in diameter. Takes gangs up to 3½" thick. The saws are automatically indexed and sharpened within variation of plus or minus .001 of exact diameter of entire lot.

Write for Folder 57T.



THE WARDWELL MFG. CO.
3165 Fulton Rd. Cleveland, Ohio

Heatbath Book

Penetrate, Phytanium-Blended Finish For Steel, 20-page book just announced by Heatbath, Inc., Springfield, Mass., is said by the firm to be the first fully detailed, complete information on the process made available to the trade.

Booklet describes the process, said to apply protective, penetrating finish to steel, brought about at low temperatures thru chemical action on steel surfaces by the laboratory-controlled formula.

Resultant finish is claimed to be durable, rust resisting, attractive, and to impart friction-reducing qualities.

The book gives results of various practical tests and details equipment and apparatus available for application of the process to a large variety of products.

Ideal 25th Anniversary

A new 3-color brochure by Ideal Commutator Dresser Co., 1441 Park Ave., Sycamore, Ill., Machinery Products Div. marks the company's 25th year. Booklet reviews the company's line of machine tool accessories which, during its life, thru research and close contact with the problems of the industry, have been continuously developed and improved, it is stated.

Illustrated and described in detail are Ideal live centers, metal etchers, demagnetizers, wheel-dressers, balancing ways, variable-speed pulleys, etc. each, it is said embodying distinctive developments in design and construction aimed to advance efficiency, economy and production.

GOOD NEWS! for DIE MAKERS

Transfer Points Eliminate Guesswork in Die Making

There's no chance for error when you use transfer screws as markers in setting dies. Points are of uniform height above hex base. Six accurately made and hardened screws nest in a special holder with hex wrench tip. Made in ¼" to 1" diameters.

3/16"	\$1.50 per set	5/16"	\$1.25 per set	7/16"	\$1.40 per set
1/4"	1.20 " "	3/8"	1.35 " "	1/2"	1.50 " "

HEIMANN MFG. CO.,

URBANA, OHIO

ALCO FOR ALL AUTOMATIC SCREW MACHINES



ALCO
ACORN TYPE
DIE HOLDER

Modern production demands call for modern equipment. ALCO Die Holders are standard equipment on most modern machines and a must on old machines—brings them up-to-date and makes them produce accurate work.

Stop those taper threads—Stop those torn threads—Cut perfect threads all ways.

Equip with Alco Acorn Type Die Holders.

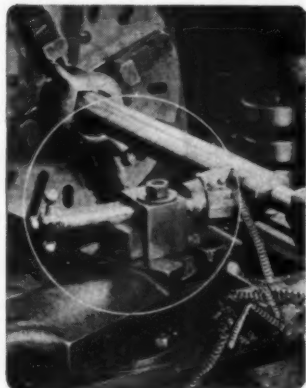
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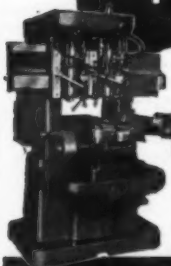
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Ask for Bulletin 680-A

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Genesee Issues Condensed Catalog

A convenient 6 x 9" condensed catalog covering its complete line of cutting tools is offered by Genesee Tool Co., Fenton, Mich. Only 5 years old, this company has grown to be an important producer of cutting tools in the middle-west. The catalog not only illustrates and lists sizes of standard tools available but also shows a large number of group photographs of special tools which the company is equipped to produce.

The catalog also contains a number of useful tables covering standard items such as standard keyways for cutters, dimensions of Morse and B & S taper shanks, weight per inch of round bars, etc.

Both tungsten carbide and H. S. S. cutting tools are produced by Genesee.

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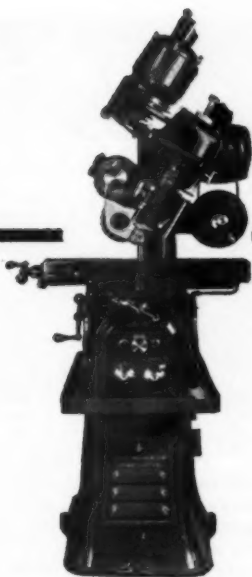
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ing Tolerances; Aircraft Sheet Stock; Aircraft Rivets and Rivet Information.

Instructions and drawings are given on 10 Primary Riveting Jobs:— (1) Driving AN 430-AD-4 - ? Rivets (Roundhead); (2) Drilling Off Rivet Heads; (3) Drilling Exercises; (4) Driving AN-455-AD-4-? (Brazier Head) Rivets; (5) Driving NAF 1009 Rivets (Countersunk Heads) (Dimpling Rivets); (6) Driving NAF 1009 Rivets (Flush Rivets); (7) Driving Rivets on a Countersunk Curved Plate; (8) Use of Offset Rivet Set; (9) Blind Riveting; (10) Test Plate and Sub-Countersinking.

The book has 32-pages, 8 1/4 x 10-3/4" and is bound in a substantial heavy paper cover. There are many illustrations and the text is condensed.

Aircraft Riveting

The Fundamentals of Aircraft Riveting are presented in a new publication issued by The Bruce Publishing Co., 540 N. Milwaukee, Wis.

The author is George E. Tabraham B. S.; M. A., Supervisor of Aeronautical Activities, Detroit Board of Education, and the price is 50 cents.

Explanatory chapters cover:—Stick-Thru Allowances; Dimensions for Buck-Tail Rivets; Countersunk Rivet-

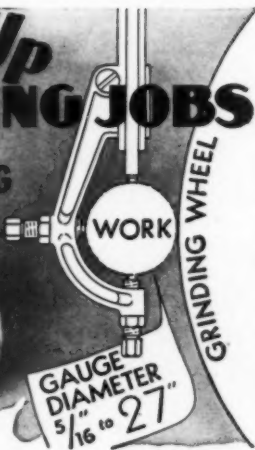
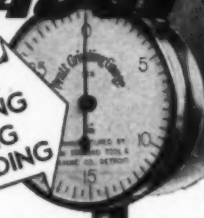
Book on Priorities

WPB, Division of Information, has just released an 84-Pg. booklet, thoroughly covering the subject of Priorities And Industry. Starting with the overall pattern, the work goes thru 6 chapters and 5 appendices, giving all regulations and interpretations of many of the most important. Contained, also, is a list of all priorities field offices, regional directors and district managers. Copies are available from WPB.

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American

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"Safety"

Despite the fact that General Electric Co. has more than doubled manpower in the past 2 years, and has taken on thousands of employees without any previous experience in factory work, the number of days lost due to accidents in 1941, per 1000 hours worked, was the 2nd lowest of any year on record.

The firm can well be proud of such achievements.

George E. Sanford, chairman of the general safety committee of the company, who made the announcement, added that the first quarter of 1942 shows a 50 per cent improvement over the same period of 1941.

Lowest year on record was 1940, with no fatalities and only 0.26 days lost per 1000 man-hours. In 1941, including four fatalities for which the safety record is charged 6000 days each lost in accordance with national regulations, the severity rate was only .50; for the first quarter of this year it has dropped to .30 days per 1000 man-hours. Accidents are charged against safety record on a prescribed basis, the loss of a hand costing 3000 days, one eye 1800, and so on.

The total number of lost-time accidents, for the first quarter of this year, is only 5.57 per million man hours worked, or approximately one accident per million hours more than the lowest on record—4.29 in 1939.

Only two occupational fatalities have occurred this year—and one of these was not while the employee was at his regular work, but while he was on his way from one building to another. Previous to this G.E. ran up 138,000,000 man-hours without a fatality.

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HERE ARE A FEW OF MANY PARTS DONE ON HAMMOND AUTOMATICS

Illustration shows: Aluminum fuse and steel fuse bodies, steel fuse and brass fuse parts, 75 MM shell, hex nuts, pinion gear, steel bronze bushing, 37 MM shell body, 37 MM shell, aircraft spark plug and aircraft piston.

Send samples for complete engineering report.

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BOOTH D-122
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CLEVELAND
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INC.

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Conservation

Enough aluminum to build 10 army bombers is reclaimed every 30 days from machine shop leftovers, according to W. J. Laird, head of the Westinghouse Reclamation division, Linhart works.

Of the 1,180,000 lbs of non-ferrous metals reclaimed last month, aluminum accounted for 120,000 lbs. This economy program conserves materials needed in national defense, saves Westinghouse

money and helps maintain increased production. Reclaimed metals include aluminum, copper, aluminum base alloys, recovered from machine shop remnants shipped from various Westinghouse plants.

After pure aluminum and copper are removed from the metallic mixture, remainder is divided into about 50 alloy categories. Placed in a revolving bucket, a batch is thoroughly mixed and tested to determine exactly what metals it contains and how much of each is present. To get the right percentage of metals that for a specific alloy, various amounts of pure metals are added and mixed with the reclaimed.

Gas furnaces resembling huge tea kettles are

the melting pots that blend the metals together. Up to 20,000 lbs at a time can be crammed into each furnace, fired at regulated temperatures ranging between 1800-2300° F, and poured into molds to form 100 lb ingots. Tested again by chemical analysis to establish the metal content of the alloy, the ingots are assigned identification numbers. The metal then is ready for use at Linhart works in making various types of castings.

YES — WOMEN OPERATORS TOO CAN DO FAST, ACCURATE TAPPING

on this

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FOOT-OPERATED
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MACHINE

The skill usually needed in tapping is built into this machine with its hair-trigger sensitive friction clutch and sensitively counterbalanced foot pedal. All the operator has to do is place the work and step on the pedal. That's why practically any operator, male or female, can maintain a production of **2400 accurately tapped holes per hour** with the standard 2-spindle head—and up to **12,000 holes per hour** with available Etcco-Emrick Multiple Tapping Heads. **BULLETIN No. 4** gives full details about the Machine and **BULLETIN No. 3** covers the Multiple Tapping Heads.

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MULTIPLE TAPPING AND DRILLING HEADS • TAPPING MACHINES

Progressive Exhibit at Metal Show

To be exhibited for the first time at the National Metal Show in Cleveland, Oct. 12-16, is Progressive Welder Co.'s, spectacular new "Temp-A-Trol" welder, "the machine that thinks for itself," designed for the welding of heavy section alloy steels, etc. The machine, now in quantity production, departs radically in operation from conventional spot welding practice in that the temperature at the weld is used to control the machine rather than the customary cut-and-dry regulation of current and time.

The second important feature made possible by this device is that the weld itself and adjacent areas can be heat-treated and tempered, etc.—immediately after welding—without removing part from between electrodes.

In addition to the new "Temp-A-Trol," Progressive Welder will also exhibit welding guns designed for fabrication of aluminum and aluminum alloys, stainless steel, etc.; the new

"Revers - O - Charge" condenser discharge control for aluminum welding; a new Rocker Arm welder designed specifically for the welding of aluminum; etc.

It is understood that the new "Temp-A-Trol" welder will be exhibited in actual operation at the Metal Show.

Honing and Superfinishing Stones

A 4-page folder citing the advantages of uniformity of hardness and grain structure in honing and superfinishing stones was published recently by the Mid-West Abrasive Co., 1960 E. Milwaukee Ave., Detroit, Mich. The folder, in reality, is a revised, up-to-date edition of a similar folder issued by the same firm several years ago. Printed in gold and blue and handsomely illustrated, it features the company's well-known Micro Bond honing and superfinishing stones. The back cover contains a chart to be used as a guide for the selection of the proper stones intended for use on steel of known hardness.

2

Safety Practice Reference: Industrial Skin Protection

Now, more than ever before, the nation's leading industries rely on PLY Creams and Liquids for the prevention of industrial dermatitis. There are specific PLY formulae for protection against acids, alkalis, biological agents, chemicals, explosives, dyes, paints, oils—all the hazards of industry. PLY is harmless, easy-to-apply, economical. Write for **FREE BOOKLET** "The Answer to Industrial Dermatitis."



PIONEERS OF SKIN PROTECTION IN INDUSTRY

The MILBURN Co.

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MICHIGAN

Explains Tool Engineering

Tool engineering has had enormous effect upon nearly every phase of the advancement of civilization. Frank W. Curtis, Van Norman Machine Tool Co., past president ASTE, recently told the association. The cost of automobiles, refrigerators, radios, and many other products, said Curtis, would have been far beyond the reach of the average man if it were not for the science of tool engineering.

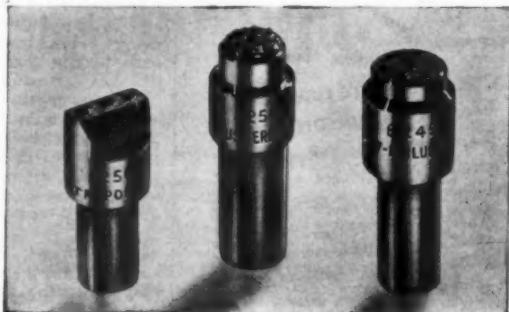
different. Tooling has become of vital importance, and management realizes how necessary it is to tool-up adequately to meet production demands within stipulated costs.

Those engaged in the field of tool engineering know, perhaps better than anyone else, that tooling cannot be valued by its cost, Curtis said. Cost is a factor, of course, but performance is what counts and what must be attained if our tooling is to be successful.

Not many years ago, interchangeability of parts was considered an expensive undertaking, limited only to the manufacture of products in exceptionally large quantities. Today, however, thru close study of manufacturing methods, almost any type or style of product can be made interchangeably, even tho the output may be considered relatively small.

During the past few years, management has learned to realize that tool engineering is the 'backbone' of successful manufacture. Not so long ago, however, some executives were not too familiar with the so-called hidden advantages of 'tooling,' and looked upon special equipment as some kind of unnecessary overhead that merely cost a lot of money. Today, the picture is quite

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Dressers assure faster
and more accurate grind-
ing—help speed vital
war production. Numer-
ous sharp points are al-
ways exposed to the
work or face of wheel.

New points can be secured by turning the dresser a quarter or half turn. The small diamonds are more reasonable in price, and remain sharp longer, than large stones . . . We also make a complete line of single point diamond dressing tools, and build special dressers to order.

Write for new literature.

W. F. MEYERS COMPANY, Inc., Dept. BB, BEDFORD, INDIANA, U.S.A.

Bear Dy-Namic Balancers

War Production is hastening adoption of Dy-Namic Balancing to eliminate noise and premature wear of shafts, bearings, etc. resulting from excessive vibration of rotating parts caused by couple action. Bear machines make this new technique available to every manufacturer and maintenance concern requiring Dy-Namic Balancing for either products of their manufacture or for their own production line machinery, motors, etc.

Bear Balancing Machines are claimed to indicate the disturbing centrifugal force or force couple with a high degree of accuracy. Both angular position and value or amount of unbalance are shown at the same time. It is unnecessary to static balance before a Dy-Namic Balance test can be made. The machine reveals whether a static or Dy-Namic unbalance, or both, are present without reversing ends of body being balanced.

Machines are available in a variety of models ranging from bench models

to large floor and pit-type models for balancing such rotating parts as armatures, fans, blowers, fly-wheels, hubs, drums, propellers, gears, impellers, pulleys, wheels, rotors, etc. weighing from 6 ounces to 1000 pounds.

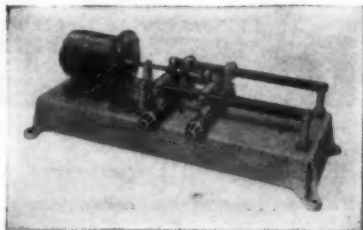


Illustration shows the new Bear Bench Model 335 for Dy-Namic Balancing of small parts, weighing from 6 oz. to 20 lbs. Catalog containing complete line and data relative to the Bear Dy-Namic Balancing Technique is available. Address the Bear Mfg. Co., Industrial Div., Rock Island, Ill.

Conversion

Steel turbine spindle shafts for naval vessels are now in production at a plant of the Pittsburgh Plate Glass Co. under subcontract from the Steam Division of Westinghouse Electric & Mfg. Co., according to L. E. Osborne, Westinghouse vice president.

In the effort to speed production of this vital war equipment, more than \$15,000,000 worth of subcontracts have been placed by the Steam Division, where turbines and gears for naval and merchant vessels are built.

Spindles are the "heart" of a war vessel's power plant. They are the spinning hubs to which multiple rows of blades are fitted, to utilize the energy of high-pressure, high temperature steam, which causes the spindle to revolve and thru speed reduction gears, turn the propeller.

The glass company's normal production of flat glass of various kinds calls for large-sized lathes, used to keep huge forming rollers in working condition. With the assistance of Joseph C. Bohan, manufacturing engineer of Westinghouse as a consultant, Pittsburgh Plate Glass was able to convert these lathes and retool them to operate at the extremely close tolerances need-

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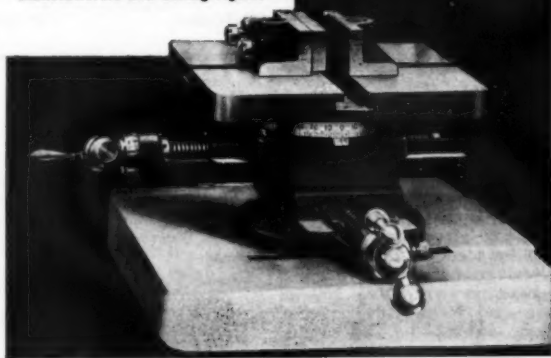
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ed for machining the intricately-shaped turbine spindles. Westinghouse also supplied many of the special tools required for the task.

Tolerances as fine as 1/10,000th of an inch are common practice in the production of such marine propulsion equipment, which must be built to stand up under almost continuous operation over a wide speed range in the exacting job of driving Navy's men-of-war.



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As a result of the shape and unique arrangement of their teeth, all Severance Countersinks take fairly heavy cuts, produce very smooth seats, and minimize the possibility of chatter.

Write for more information on "Chatterless" Countersinks—Midget Milling Cutters—and Tube Deburring Cutters.

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Flame Hardening Machine

A Flame Hardening Machine is announced by Hydraulic Machinery, Inc., 10421 Grand River, Detroit, Mich. Base and external housing structures are of welded steel design... Electrical control and hydraulic power as a motive source are said to provide positive and flexible operation. Parts that require adjustment and routine maintenance, viz., pilot light, burners and water coolant are on the outside. These are located on the rear slide. Proper shielding directs the flame and the water to the exact surface required, assuring uniform results. Working parts are adequately shielded from the heat, in the machine proper, preventing chances of distortion and misalignment. Water is used as a quenching medium and it is completely sealed from the actu-



ing mechanism. Sprocket or part to be hardened is manually loaded onto the index table, the pilot positioned with a locating pin and after the start button is pushed, the machine goes thru its complete cycle, stops and is manually unloaded.

V for Variety of jobs they can do



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9 FEDERAL SIZES

Federal Open-Back, Inclined Presses are available in nine sizes, with capacities ranging from six to 80 tons—either flywheel or geared type. They are the products of 40 years' experience in press building.

Silver Resists Corrosion

Contrary to general impression, silver does not oxidize readily at ordinary or even at fairly elevated temperatures, and when the oxide is formed it is not stable. Heating the oxide results in freeing oxygen and reversion of the silver to its pure state. A sulfide film is readily formed in atmospheres containing sulfur, and results in the tarnishing sometimes referred to as oxidation. The sulfide

film, however, has high electrical conductivity and is not a serious detriment to electrical contacts.

Silver is also highly resistant to many forms of chemical attack referred to as corrosion and for this reason is extensively used in lining containers and other equipment employed in the chemical and food industries, among others, not forgetting the important photographic industry, the acetate rayon industry and the dyestuff industry. Condensing coils contacting with acetic acid of all strengths have shown no deterioration in fifteen years. Even aqua regia, which dissolves gold and platinum, has little effect upon silver beyond forming a protective chloride

film upon the surface of the metal.

Silver is used in the beer industry, as contact with silver does not change the color or flavor of beer. Distillers of essential oils employ silver lined pans, coils and taps. A protective silver fluoride coating is formed on silver in contact with fluorine, but recent investigations have shown that silver is not attacked by aqueous hydrofluoric acid. Use of silver for handling both wet and dry chlorine is common in filtration plants.



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But we're even more proud of the big volume of precision built collet chucks we're turning out daily to help America's arms production.

The Universal collet chuck shown here has ground threads, ample room for tool feed out and is ideal for holding end mills, keyway cutters, drills, etc. Write for facts.



UNIVERSAL
ENGINEERING COMPANY
FRANKENMUTH, MICH.

Honing 26" Cylinder Bores



In the days before the safety razor, honing a true edge on a sharp razor blade was a familiar and exacting task. Fine precision was required.

To obtain still greater precision in constructing gasoline and Diesel engines, some manufacturers have been honing the inside surfaces of the engine cylinders. This became the practice about 10 years ago.

Since its inception, honing of cylinders has been confined to the smaller sizes. To apply this process to some of the larger engines is a first-class engineering job.

The Cooper-Bessemer Corp., manufacturers of Diesel engines, has erected a machine in its Mount Vernon (Ohio) plant which will hone a cylinder with a bore as large as 26" and up to 6 feet in length.

This is believed to be the largest vertical cylinder-honing machine ever constructed. Heretofore, R. L. Boyer, Chief Engineer says that honing has been confined to cylinder bores under 16" in size.

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You cut cutting costs by getting more cuts per blade.
See your distributor today!



SPARTAN SAW WORKS, INC. SPRINGFIELD, MASS.

The machine was designed and constructed by Cooper-Bessemer tooling engineers and craftsmen because it could not be purchased at this time. It stands about 20 feet high and just clears one of the overhead cranes.

In explaining need of such a machine, Boyer pointed out that there are 3 methods of finishing engine and compressor cylinders, namely:—boring, grinding and honing. The Cooper-Bessemer Corp., has had equipment for finishing cylinders by all 3 methods.

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brings all adjustments under absolute micrometric control of the operator without stopping tool or machine. In Jig Borer, Milling Machine or Horizontal Boring Mill, it bores, faces, counterbores, turns outside diameters, mills flat surfaces and slots, under-cuts, recesses, back-faces and does an almost limitless range of "headache" jobs. Send for bulletin. Address all communications, inquiries and orders to

THE PRECISION TOOL COMPANY
P. O. BOX 155, BROOKLYN, NEW YORK

Cable Address: "Pretool-New York" Tel: MAin 4-1064

From their experience, it has been found almost impossible to maintain the required tolerances on the bores of the cylinders by boring. This is particularly true on 2-stroke cycle power cylinders with ports because on these cylinders the cut is intermittent.

Grinding of cylinders above a certain size is also quite a problem because of the overhang of the grinding wheel on the spindle.

Honing of cylinders has been found to be the most satisfactory method of finishing because honed cylinders have a truer surface than cylinders finished in any other way; and extremely close bore tolerances can be maintained by honing.

It is believed to be the first time that an electric control has been applied to this type of machine. The simplicity of operating is illustrated by the fact that an operator with only 1½ years' experience in the machine shop learned to operate this new machine in a few days.

Ampeco Metal Booklet

Illustrative of applications of its product in meeting demands of war-plane construction and modern flight conditions, new booklet by Ampeco Metals, Inc., Milwaukee, is announced. Featured are non-magnetic parts for plane windshields, precision-machined engine parts, propeller parts, etc. The firm claims steadily growing appreciation of its product's high physical properties, and the booklet is purposed to point the way to increased range of uses of the metal by American industry.

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Eliminates Hand Lapping

Case History No. 6

Lapping of intricate H.S.S. compression dies, with a Universal Slotmaster, requires a man's time only while setting up the job....

The operation is started by lowering the lapping arbor to the mouth of the die opening and then setting the down-stroke of the slotter so that it will completely compress the spring, which is mounted between a shoulder on the shank of the lapping arbor and the tool holder. The spring then gradually relaxes and the lapping arbor works its way into the opening, as a result of spring pressure and the stroking of the slotter. When the spring is completely relaxed—the down-stroke of the slotter is again set up to completely compress the

Thumbnail illustrates set-up.

SLOTMASTER can be used on milling machines and provides double duty facilities at a minimum cost. It requires but little time to change-over from one head to the other... The stroke of the ram is adjustable from 0 to 4" .. the speeds range from 50 to 250 s.p.m. The tool holder of the clapper box type, can be turned in any position... All of the working parts are of tool steel heat treated and ground to close tolerances... **SLOTMASTER** comes complete with pulleys, motor, belt and mounting adaptable to round over-arm or flat-on-round-overarm milling machines.

Send for 4-page catalog and give the specifications of the milling machines that you wish to equip. Immediate deliveries on high priorities.

EXPERIMENTAL TOOL & DIE COMPANY
12607 Greiner Detroit, Mich.

spring and the operation length of the opening in is repeated until the full the die has been lapped.



Conventional set-up on round over-arm milling machine.

Rust Protective Wrapping

Rust, dust and corrosion are silent, powerful enemies of a smoothly running war machine. They are particularly damaging if they can attack before parts are finally assembled and the weapon, instrument or vehicle put to use.

adds strength and helps make the material oil and acid resistant. The wrapper was developed by the Dearborn Chemical Company, of Chicago, and comes in several types and thicknesses.

Buy United States War Savings Bonds and Stamps

Therefore, these enemies must continually be guarded against during fabrication and shipping of ammunition, guns, range-finders, tanks, planes, and spare parts. Traditional protectors against rust-inducing moisture has been a layer of thick grease, but it takes far too much time and labor to remove the grease, as any World War I soldier who was presented with a grease coated rifle well remembers.

To save valuable man hours otherwise spent in such cleaning operations, a number of plants engaged in war equipment work now use a new tough, moisture-proof wrapping material. It is made of Du Pont cellophane film laminated to a light, cotton fabric known as scrim and then impregnated with other moisture-proof materials. It can be sealed either by twisting the ends of the package by hand or by using a heat-sealing device.

The cellophane

TIME SAVER

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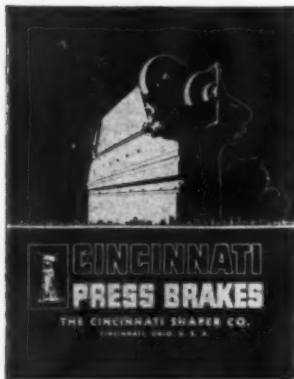
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Press Brakes and Their Uses



An attractive and helpful 64-page treatise on Press Brakes and their uses has been published by The Cincinnati Shaper Co., Cincinnati, Ohio. For the most part it is devoted to illustrations showing typical press brake applica-

tions, bending and punching load charts, features for special work and numerous pages of dies and their uses.

The book really is a very complete manual on modern press brake practice. It is unusually timely because of the increasing use of these machines in sheet metal fabrication in the manufacture of combat tanks, planes, ships etc. Many forming operations are shown in detail—also progressive forming operations, straightening armor plate, corrugating and curving, notching and forming, punching, trimming and embossing. Details of the use of micrometer adjustment gauges are given; also fixed center and adjustable punching equipment. Acute angle and flattening dies are discussed and illustrated; also dies for 90° and offset bends, as well as four-way and radius dies, U-bend, beading, wiring, channel, seaming, box and other dies.

The book contains many large scale pictures and drawings, and there is not too much text. It presents a wealth of valuable information for any technical library and is a credit in every way to its sponsors.



GET YOUR ANSWER AT *America's War Conference on Metals!*

War has developed new products, new production equipment and new ideas. All of these aids to greater production will be shared when the metal industry meets for the 24th year at the National Metal Congress and a War Production Edition of the National Metal Exposition, the week of October 12, in Cleveland.

Here is your opportunity to discuss your problems with other leaders in the industry. It is your opportunity to see what war metals are adaptable to your production, to study the best in equipment and supplies, to learn how other plants are meeting their war problems.

This is your opportunity—and your responsibility—to help your industry carry forward its giant task of winning this war of metals. You may listen to as many as 100 technical papers presented by the four great cooperating societies. You may attend the numerous war production conferences. You may consult with manufacturers' experts in more than 230 educational displays. Plan to attend this great war conference on metals.

● **Display Space Still Available**—more than 230 manufacturers have reserved 89% of the display space available in this 100% educational meeting. If you serve the metal industry, reserve your space now and put your technical experience and information on the war production line, where it will do the most good today.

TIME

OCTOBER 12 TO 16,
MONDAY THRU FRIDAY

PLACE

CLEVELAND'S
PUBLIC AUDITORIUM

EVENT

THE NATIONAL METAL
CONGRESS AND
WAR PRODUCTION EDITION
NATIONAL METAL
EXPOSITION

THEME

INCREASED PRODUCTION
OF WAR PRODUCTS

Brauer Universal Shaper-Mill

Any shaper, 20" or over, may be converted into a versatile milling machine with a new shaper-mill developed by the Brauer Machine & Supply Co., P.O. Drawer 1469, Oklahoma City, Okla. The conversion may be made speedily for it involves the mere bolting of the attachment to head of shaper ram.

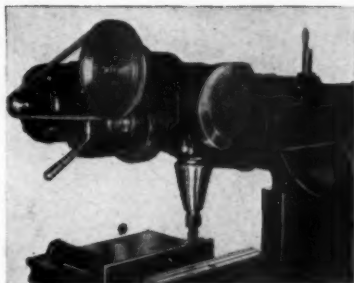


The mill is equipped with spiral bevel gear drive (4:1 ratio on main drive gears) and has roller bearings thruout. Compound gearing is obtained by 2:1 ratio helical gears—large gear is of fiber composition with steel pinion. Spindle runout is guaranteed less than .001".

Twelve or more spindle speeds of from 60 rpm to any speed required may be obtained by interchanging pulleys, 2 pulleys being supplied for the motor and 3 for the mill.

The mill is easily fitted to different sizes of shapers since the adapter cradle is first rough-machined and then machined to fit the shaper ram on which it will be used. This is a simple turning operation.

In attaching, compound head is removed from shaper ram and the mill bolted in place with 2 bolts. Shaper stroke is set on zero, and the tool-spacing screw in ram is used to run ram in or out. Then ram is locked in position with set screws behind ram gib. Shaper is then run to operate cross-feed. Operation is that of an ordinary milling machine.



Light weight and compactness make the shaper-mills especially useful for shops on ships or for portable shops having shapers available. Also to release milling machines for other work.

The units handle any type of milling work. Spindle bore is No. 4 Morse taper with socket for end mill work, (taking end mills up to 1½") and for 1¼ and 1" arbors for ordinary milling.

Spindle is of chrome nickel steel and has large roller bearing in front with 2 roller bearings in back of shaft. Latter bearings are 8" apart with cutter 5" from front bearing. Machine may be turned for milling thru an angle of 90°, and may be clamped in any position from horizontal to vertical. Motor and spindle are so arranged that mill can be used for grinding.

Motor arrangement is such that almost any single or 3-phase ball bearing motor may be used. Motor furnished is 1 hp, 1750 rpm, single-phase, 110 volts. Motor bracket has slotted base holes and motor stand is slid in or out to adjust belt position by loosening clamp handle. Motor is directly fastened to milling head and moves with head for angle work.

Raising Employee Morale

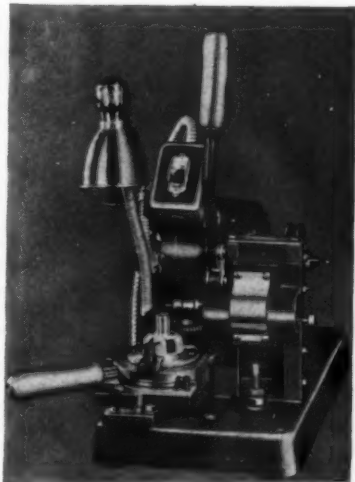
War Production Institute, with headquarters at 1991 East 66th St., Cleveland, Ohio, is distributing to war plants a sign created by the U. S. Government for the purpose of raising employee morale and increasing industrial output.

The sign is available to plants which are devoting 50% or more of their production to the war effort. It is printed on high grade banner sign cloth in brilliant red, white and blue. The dimensions are 48 by 72". It will last one year under normal conditions.

This sign has been used in a number of test cases and has been found to stimulate new effort and reduce slow-down tendencies among plant personnel. Experience has shown that the best places to mount it are in the shop where the worker can see it without moving from his machine, near water fountains, in factory training classrooms, in plant cafeterias, and in employee locker rooms.

Hand Miller for Small Parts

A new, light, inexpensive hand miller has been developed by H. D. Rouse & Co., 2216 North Wayne Ave., Chicago, Ill., thru experience gained in the machining of small parts, and is now being placed on the market.



This is a high speed ball bearing, motor driven bench machine which is

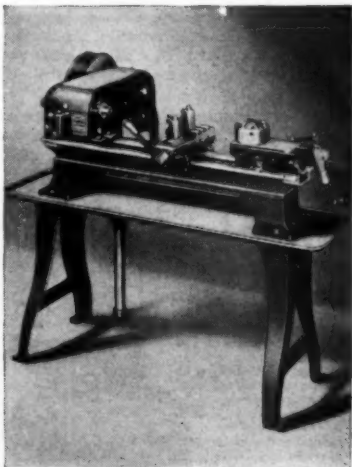
suitable for handling light cuts in brass, aluminum, and similar materials.

It can be used on small parts for radios, instruments, electric motors and devices, aeroplanes, and similar equipment. Thru the use of special fixtures developed for each particular piece, the machine is capable of very high production.

The spindle is adaptable so that either small circular milling cutters or small end mills can be used on the machine.

It is a versatile machine for small work where speed and accuracy are essential.

Logan Turret Lathe



The Logan Engineering Co., 4901 Lawrence Ave., Chicago announces production of its No. 830 Hand Screw Machine which has a capacity of $\frac{5}{8}$ " round bar stock. This new lathe was developed to meet current day needs for a small fine tool capable of accurate and continuous production. The makers emphasize that because small parts made from bar stock of $\frac{5}{8}$ " diameter and smaller can be turned out with the same speed and precision as

on larger machines, the latter can thus be released for heavier work. Features of design and construction include:—precision ground bed with 2 prismatic "V" ways and 2 flat ways; precision, pre-loaded ball bearing spindle mounting; turret holes are bored from the headstock; turret and cross slide are provided with adjustable gibs to compensate for wear. The entire machine is built to rigid and exacting specifications of the same high standards that have characterized all Logan Lathes. A new speed collet chuck for handling round work which may be fed thru the spindle and a bar feed attachment are offered as accessories.

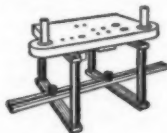
Acro 3" Die Cradle

A new 3" Acro Die Cradle has been developed to handle smaller work sizes than the standard 7" Cradle now said to be widely used in tool and die rooms.

The manufacturer states that many requests for a smaller parallel unit prompted him to produce the 3" cradle

to permit handling a wider range of sizes.

Like the 7" cradle, the smaller unit is said to be made of high grade steel, hardened and ground to close tolerances to insure a safe, accurate foundation for expert workmanship.



It is claimed that these cradles make tool, die and machining operations easier, faster and safer with better work as a result.

Complete details of the new Acro Die Cradle may be obtained from Acro Tool & Die Works, Dept. A, 5324 North Kedzie Ave., Chicago, Ill.

Hydraulic Drilvise Bulletin

A Bulletin has just been issued illustrating and describing the Drilvise, an automatic vise for drill press work, and other operations. The vise is hydraulic, entirely foot-controlled and operator's hands are wholly free for the work.

By foot-operated levers, Drilvise is said to give any holding grip from contact to more than 10,000 pounds. Foot pressure moves the rear jaw forward 3/16" at a time until required grip is obtained.

It is made by Studebaker Machine Co., 9 South Clinton St., Chicago, Ill.

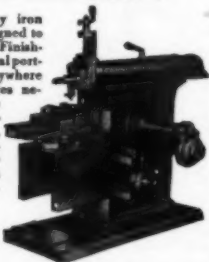
Colloidal Graphite Booklet

A booklet, just released by Nassau Laboratories, Hackensack, N. J., consists of a compilation from case histories of hundreds of engineers and maintenance executives on the application of colloidal graphite lubrication to everyday plant maintenance problems. It is entitled, Plant Engineer's Handbook, and offered as a guide to increased war production.

It is thumb-indexed and covers applications covering a long list of items, which should be of interest to engineers and maintenance men, everywhere.

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Sturdy, rugged gray iron castings rigidly designed to give long service... Finished Shaper makes ideal portable tool for use anywhere in shop... Eliminates necessity of tying up big, expensive equipment on small jobs. Available semi-machined or as foundry castings. Includes all material and blue-prints.



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Electrical Blueprints

A new "how-to-do-it" book on the reading of electrical blueprints has been written by Gilbert M. Heine, Drafting Supervisor of Work On Electrical Controller Diagrams, Cutler-Hammer, Inc., and Carl H. Dunlap, Head, Electrical Engineering Dept., American School. It is published at a list price of \$2.75 by the American Technical Society, 58th at Drexel Ave., Chicago, Ill. In preparation of draw-

ings from which blueprints are to be made, it is the practice in the electrical industry to use symbols to represent certain objects instead of drawing the pictures. As blueprints are often an electrical worker's only source of information on the job, a thorough knowledge of the significance of these symbols is essential.

The electrical industry has many branches, because of the diversified character of the work performed and machinery used. Each of these branches uses symbols designed for the types of blueprints meeting its special needs. The text of the book has been written in sections, each dealing with the symbols used in its section. Thus, one section explains how to read blueprints for wiring buildings; another, diagrams of motors and generators, etc.

The sections are arranged so that simple blueprints and diagrams are explained first, and the more difficult ones last.

A new method of presenting the symbols is used. Pages of symbols have been prepared with illustrations of the corresponding objects opposite the symbols.

Explanations are clear, and many fundamental circuits are shown with clear and concise descriptions.

Finishing Really Small Gears

Permitting rapid finishing to high accuracies of really small gears by the crossed-axis principle of gear shaving, a new finishing machine, the 861-4B is announced by Michigan Tool Co., 7171 E. McNichols Road, Detroit.

The machine, already in quantity production, is specially designed for finishing gears of less than 4" diameter and less than 1" face width. It is therefore particularly suitable for production of gears for instruments, control mechanisms, and similar precision devices in which high accuracy combined with correct tooth form, and minimum backlash, are essential to successful operation.

Designed for mass production, the new 861-4B is said to be notable for the speed with which gears can be finished to high accuracies. It is automatic in operation, with combination cam and electric control simplifying and speeding production.



In addition, machines are so designed that a number can be installed as a single battery, with one operator taking care of several machines, if necessary. For this purpose, working mechanism is located entirely in top casting (Fig. 1).

In operation, the gear which may be mounted on a specially designed mandrel or on its own shaft, is placed between dead centers with hard metal tips in the machine. A serrated-tooth rotary cutter, mounted on an axis at an angle to that of gear, engages and drives gear, first in one direction and then in opposite direction, to finish both tooth faces. During cutting action and infeed, cutter also reciprocates back and forth across face of gear, permitting use of narrow cutters. Both cutter cross-feed and infeed to correct center distance are cam controlled.

Fig. 2 shows a gear mounted on a quick-assembly mandrel. Tail stock at right is provided with a single handle, which not only pulls right hand center back for mounting of mandrel or gear in machine, but also serves in a single movement to lock and unlock this center. Center is so designed that correct predetermined pressure is automatically obtained. Machine is started by pressing a button on front. When gear is finished, machine automatically stops. Operator unlocks and retracts center with one movement of control handle, replacing gear with another one to be finished.

Machine is designed to permit the finishing of a wide variety and sizes of gears with a single cutter for each pitch and pressure angle.

While 16 is the recommended maximum pitch of gears to be finished, small gears of such pitches as 32, 48 and 64 have been successfully machined in tests on a production basis.

The machine is equally adaptable to finishing gears of stainless steel, carbon steels and non-ferrous materials including brass, bronze, fibre, etc.

Shaft mounted gears as well as gears to be mounted on mandrels may be finished. In the former case, of course, finishing the gear eliminates the effect of possible inaccuracies in concentricity between shaft and gear. Gears may be located at either end—or anywhere in between—on shafts up to 6" long, while maximum shaft length which can be accommodated between centers is 9". Cutter diameter ranges from 2 to 3" with maximum face width of $\frac{1}{2}$ ". Minimum center distance between cutter and work of spindles is $1\frac{1}{2}$ ", with a 4" maximum center distance.

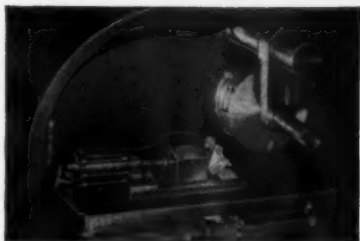
Senacon Air Motors

Senacon is the trade name of a new line of air motors, complete with universal integral valves, for use wherever powerful reciprocating motion is required. As an auxiliary for application to machine tools, these motors save time in opening and closing vises and holding fixtures, operating clutches and latches, moving work pieces and tools to and from each other, and similar operations. In such applications, the valve lever can be linked to a moving part of machine for automatic synchronous operation, eliminating manual motions.

Another important function is as prime movers for supplying fractional horsepower for such operations as tube flaring, punching, broaching, stamping, die casting and bushing insertion. It is claimed that in some cases, production has been increased to as much as 400% by these motors.

A special feature claimed by the manufacturers is that dual exhaust ports provide for selective utilization

of the exhaust air blasts for ejecting work pieces, cleaning out chips, and permitting adjustment of speed of one or both strokes.



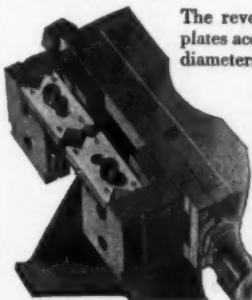
Senacon Air Motors are available in 2 standard models with strokes of $1\frac{1}{2}$, $2\frac{1}{2}$, 6, and 9". Other sizes ranging from 1 to 18" are furnished on special order.

Descriptive bulletin will be mailed by Smith-Johnson Corp., 623 East 12th St., Los Angeles, Cal.

"JOHN'S" DRILL JIGS ★★

SCREW PRODUCTS PLANTS ATTENTION

These Jigs are now supplied with Universal jaws which permit quick set-up for end drilling and tapping.



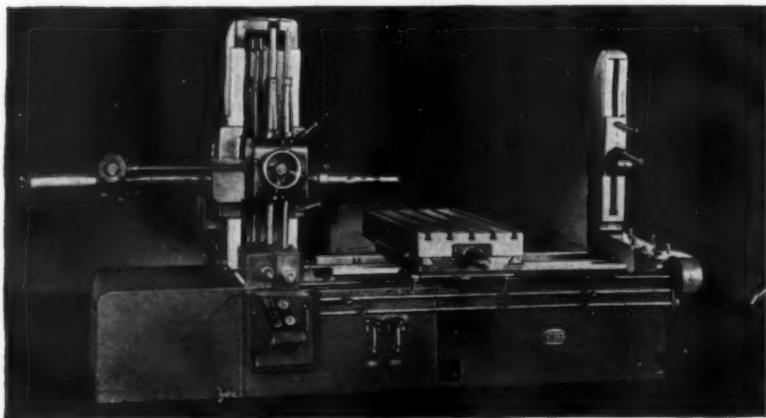
The reversible "V" plates accommodate diameters from $\frac{1}{4}$ " to $\frac{3}{4}$ " on the 6" jigs; and $\frac{1}{4}$ " to 1" on the 8" jigs.

Write for details.

HEUSER MFG. CO.

1638 N. PAULINA ST., CHICAGO, ILL.

Yoder No. 3A Horizontal Boring Mill



This new machine is said to operate on a different power principle than heretofore customary. It has been used on other machine tools for some time. It is adapted to a horizontal boring mill to give "Power Touch Control" in which touch and turn of the hand control replaces gear shifting levers. The other assortment of operations also is more easily performed.

An infinite number of speeds and feeds, are provided which may be obtained without stopping to shift gears. High acceleration and quick-dynamic stops are obtained without shock or strain to machine parts.

The maximum allowable amount of power is available at the tools. Feeds may be set to a maximum without limitations of step gears to get the most out of the tools.

Quick stopping.

Set-up speeds provide extremely slow but positive motion of cutters, tools and parts, while a man performs measuring and set-up checks without complete shut-downs on machine.

A 16 to 1 speed variation is provided on spindle and feed.

The Power Flow Drive is claimed to embody the advantages of a varia-

ble speed d-c system from an a-c source.

Torque output is said to compare favorably and to advantage over older types of drives and is applied directly without a large number of intermediate speed change devices.

Synchronized Vernier Scales are provided on head, column and outer support.

All hand adjustment screws are equipped with screw lock micrometer dials.

All controls are centrally grouped. Starting, stopping and reversing of machine and feed are controlled thru 2 bars running along front of machine. Control handles may be moved to the most convenient position. One man can easily set up a large job.

A 2-speed rapid traverse facilitates inching up to work at a slow rate and at a high rate when considerable travel must be made.

Main drive for spindle is direct from a motor, while feed drive is from another motor thru positive clutch drive.

Milling cutters and other attachments may be bolted directly to flange on outer end of spindle.

Infinite speeds are available up to a

maximum of 600 rpm on spindle and 100" per minute on feed for head, saddle and table.

Heavy multiple thread worm gear on spindle drive is said to eliminate noise and chatter.

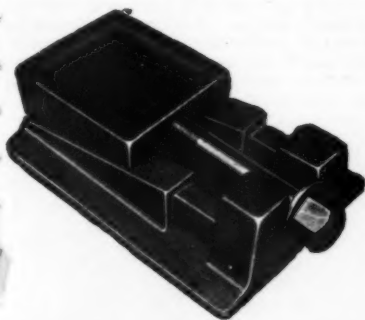
All drive shafts are of best alloy steels obtainable, mounted on anti-friction bearings.

All drive and feed gears are high strength alloy steel, heat treated and provided with oil pump flood lubrication.

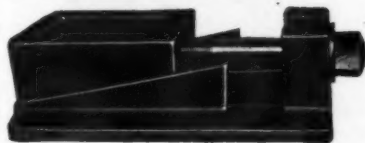
Tapered gibs are furnished on head, saddle and table.

Machine is made by The Yoder Co., Cleveland, Ohio.

Handy Machine Leveling Device



Sturdy and effective leveling jacks for the quick and easy leveling of machine tools or any industrial machinery that requires extreme accuracy of mounting, have been developed by Jurzek Machine & Engineering Co., 2305 Hilton Road, Ferndale, Mich.



The standard size jack No. 100A will fit most industrial requirements. It has a 6 x 9" base, average height 2-3/4" and a top section 4 x 4-3/4".

The illustrations show the extra large base and sturdy screw which contribute to permanent accuracy. The angular faces are accurately finished. Special sizes can be supplied on order and deliveries are prompt.

Milling Shell Staking Notches

A new multiple spindle head for simultaneously milling a number of staking notches in shell noses is announced by Kent-Owens Machine Co., Toledo, Ohio.



The illustration shows a 5-Spindle Head which mills all 5 staking notches in a typical shell at the same time. This method multiplies production over the former method of milling one notch at a time. Both actual machining time and handling time are said to be reduced to a fraction of that formerly required.

The fixture shown is designed so that the shells are rolled on to it from an adjoining conveyor, completely notched, and then rolled back onto the conveyor.

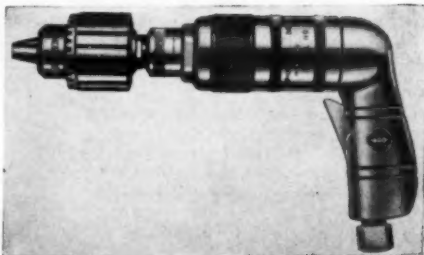
This unit can be adapted for use on either a Kent-Owens No. 1-8 Machine with hydraulic feed to the table or the No. 1-M with hand feed to the table.

Aro $\frac{3}{8}$ " Pneumatic Drill

Addition of $\frac{3}{8}$ " capacity air drills, straight and right angle to their line of rotary pneumatic tools is announced by The Aro Equip. Corp. Bryan, O.

It is pointed out that these drills available at prices only slightly higher than this company's $\frac{1}{4}$ " drills, should be suitable for a wide range of jobs.

The concern makes an extensive line of small pneumatic tools for drilling, screwdriving, nutsetting, grinding, filing, polishing, sanding, paint mixing, and similar operations. These are described in its Catalog No. 42-A.



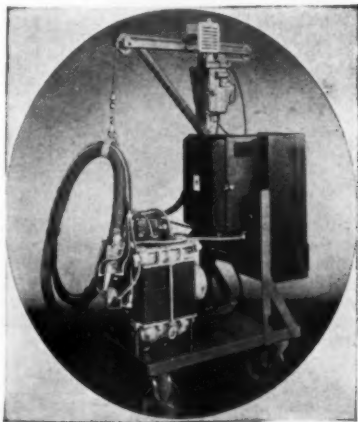
Features include screw-adjustable stroke (up to 3") to take care of a wide range of work sizes, and quick interchangeable adapters for electrodes to make gun suitable for a wide variety of work shapes. P-H concentric kickless and highly flexible welding cables and electronic controls are used in the complete assembly which is shown in portable form in Fig. 2.

Low Pressure Welding Gun



When welding brackets or clips to light gauge alloy steels, light welding pressure is required in order not to deform the metal. A gun designed for such welding operations has been introduced by Progressive Welder Co., 3050 E. Outer Drive, Detroit.

Gun operating pressure is hydraulic with partially counter-balancing continuous air pressure. The latter also serves automatically to retract points when hydraulic pressure is released, thereby simplifying operation.



Motor-Mica Bulletin

A new descriptive bulletin on Motor-Mica is available. It is $8\frac{1}{2} \times 11$ " in size, and is printed in 2 attractive colors.

According to the manufacturer, this new bulletin shows the many operations where Motor-Mica can be used

to help solve perplexing lubrication problems often found in stamping, drawing, turning, drilling, milling, threading, tapping, boring, die-casting, screw machine and many other operations. Moreover, detailed mixing instructions are contained in the folder to enable users to get the maximum benefit from Motor-Mica.

A copy of this new folder may be obtained by writing to Scientific Lubricants Co., Dept. J, 3462 North Clark St., Chicago, Ill.

Vernon Universal Tool Grinder

Machinery Mfg. Co., 1915 East 51st Street, Los Angeles, Cal., announces a new Vernon Universal Tool and Cutter Grinder. Several novel construction features are claimed to provide an exceptionally smooth and sensitive action. The Grinder handles all types of tools, cutters, cylindrical work, and internal jobs within its capacity.



Centers swing $10\frac{1}{2}$ " dia. over table. Maximum longitudinal travel is $17\frac{1}{4}$ ". Maximum work length between right and left hand tailstocks is 16". Maximum work length between headstock

and tailstock is $13\frac{1}{2}$ ". Maximum distance between centerline of work and centerline of grinding wheel spindle is 10". Transverse travel of column is $7\frac{1}{2}$ ". Vertical movement of wheel spindle is 6".



Spindle head is powered by a $\frac{1}{2}$ hp, 60 cycle, 3 phase, ball bearing motor running at 3450 rpm. The 2" OD spindle is mounted in anti-friction bearings and has a $\frac{5}{8}$ " shaft size at wheels. Internal spindle is of similar construction but is designed to take the higher speeds necessitated by smaller wheel sizes. 3 external speeds are provided and 2 internal speeds.

Of importance is the internal auxiliary drive, which is substituted for external spindle when doing internal grinding. Unnecessary wear on external spindle assembly is thus eliminated.

Grinding speeds are varied by changing motor pulleys only, for external spindle work, and by changing intermediate arbor pulleys only for internal grinding. This method of speed control eliminates possible "Brinnelling" of the precision bearings by thoughtless

tapping of pulleys in place on spindles. All connecting belts are well guarded as well as the external grinding wheels.

Spindle head swivels 360° on column in a horizontal plane and is provided with 2 suitable locks. A single control locks the column's vertical position.

Elevation is accomplished by rotation of a large hand wheel driving a 10-pitch 1¼" OD Acme screw. Screw is fitted to a special bronze nut which has a backlash adjustment, permitting accurate control of head at all times. Dial is graduated in widely spaced divisions of .001" and is adjustable for zero settings.

Many accessories are available. Standard equipment includes a universal tooth rest, plain hand and footstocks equipped with No. 2 Morse cen-

ters, and a universal work-head. The universal work-head carries 2 internal tapers, No. 50 N.M.T.B. and No. 12 B. & S., and includes motor drive assembly with motor. Spindle is mounted in Timken tapered roller bearings and is driven at any one of 3 speeds. Drive is by means of Vee belt. Footstock is provided with a tension adjustable lever release. Both footstocks and work-head are symmetrical about center line and may be used at either end of table.

Two types of wheel dressers are also available. Bracket type, for face dressing, mounts on footstock housing and is standard equipment. Universal dresser, which will dress concave, convex, straight face and vee forms, mounts on table and is a standard extra.

Sciaky Radial Spot Welder

A radial-type gun spot welder, Model P-1-R, is now offered by Sciaky Bros., 4915 W. 67th St., Chicago, in both stationary and buggy-mounted units. It is equipped with a special Sciaky welding timer and operates on single phase a-c, 220 or 440 volts. Hydraulic pressure is supplied by a hydro-pneumatic booster, which can feed a gun able to supply a maximum electrode pressure of 1,800 lb with 90 psi of air supply.

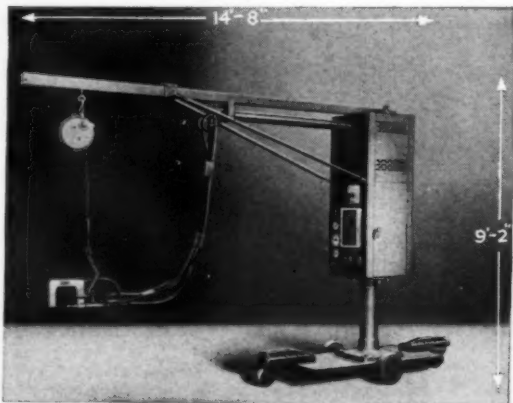
Fixed or crowded jigs can be reached easily with the portable buggy-mounted welding gun (illustrated). The maximum area reached by the stationary unit is represented by a circle of 21 ft diam.

Secondary cables are thin, flexible and short; the reduction in the usual size of secondary cables is made possible because of the use of fixed heavy copper bars (water-cooled) in the length of the secondary circuit.

In steady production conditions, this welder is said to be capable of welding:

—corrosion-resisting steel, pickled steel, zinc-coated steel and Monel metal in thicknesses of from 0.016 plus 0.016" up to 0.064 plus 0.064". It will also weld 2 unequal thicknesses up to a total welded thickness of 0.500" provided one of the two thicknesses does not exceed 0.040".

It is claimed that in welding pickled mild steel or standard steel, a speed of 180 satisfactory spot welds per min can



be attained on thicknesses up to 0.032 plus 0.032". Speed decreases as the sheet thickness increases.

Apco Mossberg Torque Wrench

Instead of 2 dial sizes with calibration ranges either of 0-600 or 0-2200 inch-pounds, Apco Mossberg's new torque wrench is made in 4 dial sizes:—(1) a unit measuring 0-150 inch pounds of tension on an outside scale, first revolution—up to 250 inch pounds on an inside scale, second revolution; (2) calibration range 0-600 inch pounds; (3) range 0-1200; (4) range 0-2400 inch pounds.



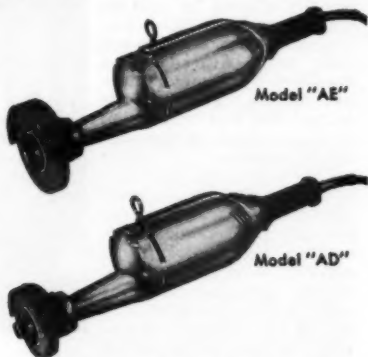
With four sizes of dials and the calibration range of each limited, dial graduations are larger, more widely spaced. This makes it possible to read them more quickly, easily—more accurately.

Mounting of the dial is also improved. Set in a special housing inside an extension of the handle, the makers emphasize that it's more rigid . . . better protected from bumps and shocks that might knock it out of adjustment. Operating accuracy is said to be guaranteed to 98%! The makers are Apco Mossberg Co., 114 Horton St., Attleboro, Mass.

Portable Grinders

Two new portable grinders have just been added to the extensive line of electric tools manufactured by Skilsaw, Inc., 5035 Elston Ave., Chicago. They are Model "AD" and Model "AE," 4"

and 5" grinders respectively. Both are purposely introduced right at the peak of America's greatest production drive because both are especially engineered to meet today's high speed requirements on all grinding, wire brushing, polishing and buffing operations.



Both the 4" Portable Grinder, Model "AD" and the 5" Model "AE" contain every feature of advanced design and sturdy construction essential to maximum performance and adaptability to wide variety of applications. Ball bearings mounted in steel inserts on armature and extreme ends of wheel spindle absorb thrust, eliminate vibration and insure cool operation. Commutator and switch are fully enclosed for protection against dust, and straight-line ventilation blows dirt away from operator and prevents clogging. Steel gears, heat-treated for long life and spline-mounted on shafts, are both strong and quiet. Powerful universal motor assures full efficiency under load. Rubber sleeve handle provides a firm, cool, non-slip grip.

Model "AD" Portable Grinder is 22" long, weighs 15 lbs., operates at no-load speed of 4500 rpm, driving a grinding wheel 4" x 3/4" x 1/2". Model "AE" has a grinding wheel 5" x 3/4" x 1/2" and operates at 4200 rpm. Weighs 18 lbs. and is 22 1/2" long. Both models assure top production on all metal grinding and metal cleaning operations in war plants of every type.

Welding with Remote Control

Hobart has developed a new remote control unit which is now a standard production feature of all welders offered for sale by the company. This improved control is protected fully from accidental breakage by a metal pull-out handle set over the control dial and by cushion springs on back of the porcelain rheostat.

The new dial, it is believed by the makers, will increase weld qualities—especially welds made under modern high speed techniques. It is well known among operators that for best results, welding heat should be increased somewhat when using coated electrodes in changing from flat position to vertical or overhead positions, and vice versa. Operators are only human, however, and with many there is a temptation to “get by” without changing machine adjustment because such changes involve repeated trips between work and machine.

With remote control, this condition does not exist, because it places 100 steps of fine volt-amperage adjustment right within reach of the operator's hand. The remote control unit is easily set up by using an ordinary lamp cord extension to connect it to the machine.

In practice, some operators have learned to weld continuously with one hand—making heat changes with the other without even breaking the arc. On other applications, it is often possible to change electrode sizes and adjust the heat to meet weld conditions without going near the welding machine.

Even in factories, where machines may be located comparatively near the work, use of the remote control feature has been found effective in speeding production and improving weld quality—especially in the elimination of weld craters. On other jobs, welding ma-



chines may be compactly located near the ceiling to conserve floor space, while operators located below the machines use remote control for fine current settings.

The large outer control dial shown, is the field rheostat which controls the differential compounds—while the remote control unit adjusts the open circuit voltage. It is said 1000 combinations of voltage and current are possible with this Multi-Range Dual Control Dial, full details of which are available from Hobart Bros. Co., Troy, Ohio.

“Master Tri-Square”

A Master Tri-Square, said to be held to limits hitherto unattained, has been produced by the Jansson Gage Co., 19208 Glendale, Detroit.

Of one-piece solid construction, it is suited to extreme precision measurement wherever 90° angles are involved. Held to limits of .00002” base and side, the Master Tri-Square is available in 2 sizes:—4” in height with a 3/8” wide standing base and 6” with a 1” wide base.

The Square is hardened, ground and lapped from alloy tool steel—final manufacturing operations being done in a

special temperature control room to assure maximum gaging accuracy. It is provided with an inset hard fibre serrated grip to prevent heat transference and to prevent slipping in handling which might cause damage to the Tri-Square. Vertical side edge is knife-sharp for truer visual gaging.



The Master Tri-Square is a basic gage for inspection departments, rounding out any set of inspection tools. It is used in laying out and checking right angle work and square surfaces; and the checking of V's, straight flat edges, and parallelism of cylindrical surfaces.

Houghton Oils Book

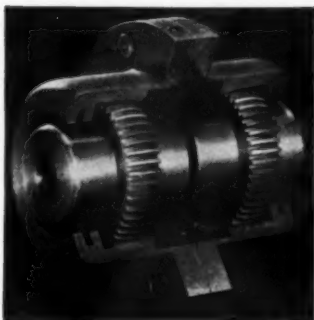
With increasing burden and responsibility thrust upon lubricants that must protect machines operating 24 hours a day, 7 days a week, fortification of lubricants by scientific processing looms more importantly than ever before. This topic is subject of a booklet, featuring its MIH series of hydraulic oils, just announced by E. F. Houghton & Co., Philadelphia, since 1865, pioneers in industrial lubrication.

Claimed for the firm's Hydro-Drive MIH hydraulic oil is increased oxidation stability, developed specifically to overcome weakness inherent in many

such oils. The improved product is said to: (1)—Increase resistance to effects of pressure, heat, moisture, agitation. (2)—Possess marked solvent ability, tending to prevent deposits of sludge. (3)—Protect parts with a film claimed to be considerably stronger.

The book gives numerous instances and illustrations in support of claims for the improved product and is offered to interested owners or operators of hydraulically-controlled machines.

Aligning Coupling



Claimed to permit misalignments of as high as 3° on either shaft, or a total misalignment of 6°, Barcus Aligning Shaft Coupling is announced in a brochure available from Barcus Engineering Co., 3941 Falls Rd., Baltimore.

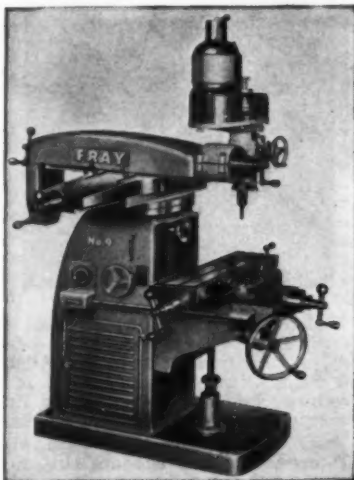
Internal gears have stub teeth with 20° pressure angle, and are cut on a true central segment of a sphere, surface teeth being of constant width thruout their length. Meshing into stub teeth of housing, produces smooth, ball action, contributing toward reduction of friction and pressure on shaft bearings that are out of line, says the announcement.

Liberal compensation, it is claimed, makes the coupling adaptable to many severe applications such as in many marine and nautical jobs, where vibration is a serious problem.

Production, according to the firm, has attained good volume for aeronautical and general machine operations.

Fray Horizontal-Vertical Mill

The issuance of a new folder on the Fray Number 9 Horizontal and Vertical milling machine is announced by the Fray Machine Tool Co., 501 W. Windsor, Glendale, Cal. The folder completely describes the machine, which is an all-purpose milling machine particularly suited to tool rooms and other shops having a wide variety of operations to perform. Practically any operation, at any angle or compound angle, can be handled, since the machine combines both horizontal and vertical milling machine functions.



For horizontal milling, the turret head is reversed and the vertical attachment swung back out of the way. Then the machine becomes a Number 2 horizontal milling machine, equally suitable for toolroom or production work.

Milling, drilling or boring operations can be done at any angle, longitudinally by traversing the ram on the turret slide, or crosswise by operating the ram in its saddle; these 2 movements when used in conjunction with the head, which can be set to operate at any or both angles, provide a

wide range of operations. The ram has a cross travel of 10" and a longitudinal travel of 18". The Type E head is normally furnished with the Number 9 machine, and the motor may be swung completely around the housing and locked at any point. An instant change can be made from micrometer wheel feed to hand-lever feed. Spindle travel is 4", fitted with either No. 9 B & S or No. 3 Morse. The horizontal spindle is National standard No. 40 taper.

Cross travel of table is 9", with a longitudinal travel of 20". Working surface is 9½" by 36". Vertical travel of table is 16".

Motor for the vertical head is a Frayco unit of 1 hp; with a Frayco 3 hp motor in base for horizontal spindle.

Export Dictionary

New Commercial - Technical Dictionary, Spanish - English, By Antonio P. Guerrero; Chemical Publishing Co., 234 King St., Brooklyn, N. Y., DeLuxe Edition, thumb-indexed, Morocco finish, flexible binding, Lettered in gold. Full-tinted edges. 1942. Postpaid, \$10.00.

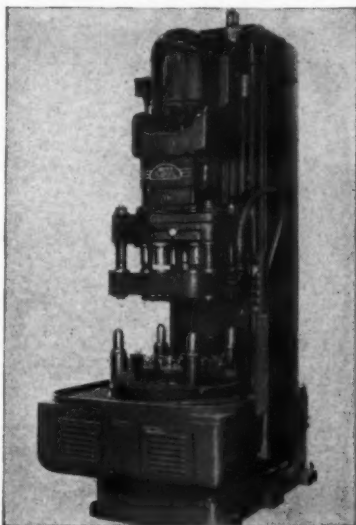
Extensive changes have occurred in the Spanish language as with virtually all others, within recent years, making this work very timely, with its many new words not in existence some few years ago. Each has been carefully translated in accordance with the Royal Spanish Academy of Languages, and painstakingly checked and verified. The volume has especial value and significance for the technician and engineer, since it was compiled by a prominent Spanish engineer.

Included have been all needed modern terms and words referring to Mechanics, Mechanical Engineering, Aircraft, Shipbuilding, Marine - Naval terms, Industrial Chemistry, Plastics, Meteorology, etc.

The publishers claim for the book a breadth and scope never before attained within a Spanish-English dictionary.

Given, also, are conversion tables of weights, measures and moneys alongside of the literal translations.

Standard Drilling Machine with Special Equipment



Snyder Tool & Engineering Co., Detroit, builders of high-production special machines for many purposes, also build a standard drilling machine in which many features of "special" machine performance are included, altho the cost is said to be about half that of a special machine of equal usefulness.

The unit shown is the 10-V-18 general utility machine. Capacity up to 15 hp, 1800 rpm for driving tools. Maximum stroke is 18" and opening between base and speed change transmission, (upon which, in this instance, a multiple head is mounted) is 36" minimum, 56" maximum. The maximum total hydraulic pressure feeding the hydraulic slide downward is 12,000 lbs.

Hydraulic oil is contained in a reservoir mounted on top of column and on inside of column are housed hydraulic pump, its motor, and counter-

weight to balance hand slide and multiple head.

This unit is equipped for hollow milling 20 bosses, using a 5-spindle head and the fixture indexes 4 times to complete the work.

The standard index mechanism provides the smooth acceleration and deceleration of the Geneva wheel, hydraulically powered from hydraulic system of the machine itself. The index table serves as a chip trough and coolant retainer.

This machine is available with or without special tooling and speed change transmission for single or multiple spindle adaptations. Only the equipment is special and it can be retooled for entirely different production by changing the special equipment only.

Machine is also available in size 20-V-16 with maximum 25 hp capacity for driving tools, 16" stroke and 19,000 lbs. total hydraulic pressure.



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**e Publishing Co.
e initial issue,
e October 15th**

What the Readers Say:

A Leading Machine Tool Manufacturer writes:

"I have just finished checking over the article by R. A. Reed, regarding 'Grinding Wheel Fundamentals' in your September issue. This article is exactly the thing needed in our educational program for new and green employees. It would seem to me that if you reprinted this in the form of a small pocket size booklet, plants from coast to coast would want quantities of them to distribute among their employees doing grinding. We could use 500 copies and perhaps more."

A War Production Board Executive says:

"Have noted your splendid cooperation with our efforts to secure salvageable metals which may be dormant in establishments of machinery plants. We greatly appreciate your interest and hope you will find ways and means from time to time to remind industrial plants of the critical need for scrap material."

The Ordnance Department writes:

"This office has copies of your Machine Tool Blue Book and we consider it indispensable in expediting for Ordnance contractors."

Here's What the Head of an Eastern Metal Fabricating Co., writes:

"Practically since the first publication of your Machine Tool Book, I have been receiving it and have been very much enthused over it. I have obtained some very helpful information from your book as to the methods of doing various jobs, where to buy machinery and tools and the editorial news."

An important Midwestern Tool Maker Says:

"We have been receiving your Machine Tool Blue Book regularly and find its contents interesting . . . interesting to such an extent that we would

like to reproduce the picture page—'Mechanics Through the Ages' which appeared in the September issue for our plant house organ."

Western Screw Products firm writes:

"May we express our appreciation of the nice work you are doing on the Machine Tool Blue Book. We certainly enjoy reading your magazine and get many splendid ideas from it. Our Company has contacted many of the advertisers."

An Eastern Metal Fabricator says:

"We confirm our telegram requesting that you wire us name of a firm listed in your 'Plants for Subcontract Work' section. We have recently received a very substantial contract from the Ordnance Dept., and have considerable work to be handed out on a subcontract basis. Thanks very much for your effective cooperation."

A Glider Builder writes:

"Our Shop Sup't., received a copy of your September Machine Tool Blue Book and in paging thru it I have found it exceptionally interesting. I was particularly impressed by the numerous advertisements indicating where various items of machine tools could be procured. I would certainly appreciate receiving the Blue Book regularly."

A Metal Products Corp., writes:

"In the September issue of The Machine Tool Blue Book is an article describing a Comparator designed by Brewster Aeronautical Corp., and used as an accessory to a Rockwell Hardness Tester."

"Since we are engaged in ordnance work and have trouble acquiring additional Rockwell machines, believe we could build a machine like you describe and speed up our production. If you can send us a further description of the device, or a sketch, it will be greatly appreciated and will help us in our war effort."

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Mechanics Through the Ages



IT WAS

WHILE WATCHING THE ACTION OF A BORER WORM IN A SPLIT OAK LOG THAT BLANCHARD IN THE EARLY 1800'S GOT HIS IDEA FOR A COMPLICATED CUTTER THAT WOULD CUT ON A STRAIGHT LINE, BORE A ROUND HOLE AND CUT DOWN AND ROUND IN ANY DIRECTION. BASED ON THIS, BLANCHARD, GUN MANUFACTURER TO THE U.S. GOVERNMENT, INVENTED WHAT MACHINISTS CONSIDERED IMPOSSIBLE - A MACHINE FOR MORTISING INTO THE STOCK EVERY PART OF A GUN!

AS LATE AS THE EARLY 1900'S, JAP-CONSCIOUSNESS OF MODERN TOOLS WAS SO HAZY THAT ADULT METALWORKERS ACTUALLY BOUGHT TOY AMERICAN TOOL CHESTS IN THE FIRM BELIEF THAT PRODUCTION WORK COULD BE ACCOMPLISHED WITH THEM!



SMITHS

WERE SO IMPORTANT IN EARLY MEDIAEVAL WALES THAT THEY CUSTOMARILY SAT IN THE GUEST HALL NEXT TO THE KING AND QUEEN.

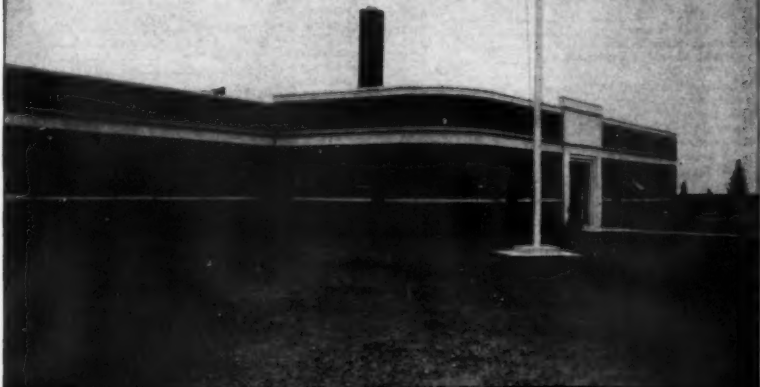
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Recommended for capacities in foot lbs. from 0 to 100, graduated in steps of 5 foot lbs. Other sizes shown range in maximum capacities from 25 to 600 foot lbs., and from 25 to 7200 inch lbs. When ordering state capacity needed.



PIONEER MANUFACTURERS OF ACCURATE MEASURING WRENCHES

P.A. **Sturtevant** CO.
ADDISON **QUALITY** ILLINOIS

O	
Oliver Instrument Co.	299
Oliver Motorcraft Corp.	94
O'Neill-Irwin Manufacturing Co.	267
Owatonna Tool Co.	55

P	
Paddock Tool Co.	344
Pellow Machine Co.	214
Pines Engrg. Company	101
Plunket Machine Co., J. E.	340
Porter-Cable Machine Co.	215
Pratt & Whitney	17
Precision Tool Co.	356
Preis Engraving Machine Co., H. P.	301
Procon Safety Chuck Co.	44
Production Machine Co.	236
Producto Machine Co.	151
Products Engineering Co.	322
Progressive Tool & Cutter Co.	281
Prosser & Son, Thomas	308
Putnam Tool Co.	95
Pyrometer Instrument Co.	206

Q	
Quality Tool Works	340

R	
R & L Tools	24
Racine Tool & Mch. Co.	309
Reading Machine Co.	80
Reich Manufacturing Co., J. H.	326
Remco Products Corp.	180
Rhode Island Tool Co.	259
Richards Co., J. A.	312
Rickert-Shafer Co.	261
Rivett Lathe & Grinder, Inc.	2
Robbins Engrg. Co.	227
Robbins & Myers, Inc.	164
Robertson & Co., F. H.	223
Rogers Machine Works	14
Rotary File Co.	112
Rotor Tool Co.	13
Rusnok Tool Works	114
Ruthman Machinery Co.	258
Ryerson & Son, Inc., Joe. T.	70

S	
S & S Machine Works	206
Savage Tool Co.	161
Sav-Way Tool & Machining Co.	56
Schauer Machine Co.	265
Scherr Co., George	103
Scientific Lubricants Co.	296
Seneca Falls Machine Co.	237
Service Equipment Co.	334
Severance Tool Co.	352
Sheldon Machine Co.	280
Simmons Machine Tool Corp.	45-169
Skillsaw, Inc.	66
Smith & Co., Anton	27
Smith & Co., D. A.	271
Smith-Johnson Corp.	204
Smith Power Transmission Co.	279
Smith Tool & Eng. Co.	296
Soosner Tool & Machine Works	311-358
South Bend Lathe Works	68
Southwest Mfg. Co.	293
Spartan Saw Works	355
Stackbin Corporation	355
Stadoll Mfg. Co.	292
Standard Pressed Steel Co.	40
Standard Transmission Equip. Co.	342

Stark Tool Co.	23
Steege Machinery Co., W. L.	172
Sterling Factory Equipment Co.	327
Sturdivant Tool Co.	54
Sturtevant Co., P. A.	385
Sun Oil Co.	135
Sundstrand Machine Tool Co.	121
Sunnen Products Co.	26
Sutton Tool Co.	174

T	
T & H Mfg. Co.	326
Tamms Silica Co.	110
Tannsville Works	315
Tatra Tool Co.	336
Taylor Machine Co.	116
Threadwell Tap & Die Co.	332
Tomkins-Johnson Co.	207
Topeka Foundry & Iron Works	325
Triton Precision Co.	30
Troyke, Alfred A.	328
Tru-Cut Tool Co.	64
Tungsten Electric Co.	12
Tuthill Pump Co.	100

U	
U. S. Tool Co.	240
United Precision Products Co.	289
Universal Engineering Co.	275-354
Universal High Speed Tool Co.	110

V	
Van Norman Machine Tool Co.	10
Victor Machinery Exchange	383
Vimco Manufacturing Co.	302

W	
Wade Tool Company	118
Wagner Electric Corp.	173
Walker-Turner Co.	28
Wall-Colmonoy Corp.	306
Walls Sales Corporation	264
Walsham Dial Gage Co.	299
Walton Co.	324
Wardwell Mfg. Co.	342
Weber Addressing Machine Co.	276
Welch Industries Inc.	35
Weidex, Inc.	118
Wells Manufacturing Corp.	197
Western Mfg. Co.	105
Western Tool & Mfg. Co.	340
Westinghouse Elec. & Mfg. Co.	286
Westlof Tool & Die Co.	297
Wheel Tracing Tool Co.	47
White Dental Mfg. Co., S. S.	198
Whitney Metal Tool Co.	188
Wilburton & Co., Thomas	191
Wiley's Carbide Tool Co.	341
Wilson, K. R.	65
Winter Bros.	41
Witteck Mfg. Co.	175
Wright, L. G.	304
Wysenbeck & Staff, Inc.	32

Y	
Yeomans Tool Co.	274
Yoder Sales Co.	78
Yost Mfg. Co.	268

Z	
Zager Tool, Inc.	314
Zeh & Hahnemann Co.	315

THE *GUTS* TO TAKE IT!



CORK THRUST PAD
COMPENSATOR FOR
HEAT AND EXPANSION
OF WORK.

HEAVY DUTY
BALL BEARING
FOR GREATER
THRUST LOAD.

GREASE SEAL
TO RETAIN
LUBRICANT.

HEAVY DUTY
ROLLER BEARING
FOR GREATER
RADIAL LOAD
CAPACITY.

LARGE SPINDLE
FOR STURDINESS
AND GREATER
LOAD.

LOCK NUT
FOR REDRESSING
POINT WITHOUT
DISMANTLING.

NEEDLE BEARING
FOR TRUE
RUNNING.

The ADVANTAGES of MOTOR TOOL Ball and Roller Bearing LIVE CENTERS

are brought directly under your eye by this "inside" illustration. Note, also, the larger spindle—the small head—and the short overhang. Add all of these precision features together and the answer is clear why they **WONT BURN OUT OR BREAK DOWN**, even at highest speeds. They have the "guts" to take it.

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Once over lightly with a good coarse grain sandpaper is no kind of treatment for man's lungs. But, in effect, that's what happens to lots of men working near grinding and buffing wheels. The grit that flies off the wheels acts as an abrasive not only on humans, but on machines as well.

The Air Master will trap this dangerous dirt the instant it leaves the wheels. A size for every grinder and buffer. Easy to install, easy to clean.

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The Cincinnati Electrical Tool Co.

DIVISION OF THE R. K. LE BLOND MACHINE TOOL CO., CINCINNATI OHIO

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**HALF of Last Year's Purchasers
have ordered ADDITIONAL
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PNEUMATIC BAR FEED

Definitely increases screw machine output!



TIME and again we told you that this faster, easier and safer Pneumatic Bar Feed would step-up your screw machine output. We said that screw machine operators in plants all over the country were claiming production increases ranging from 10% to 30%. But now here's word from the owners and plant managers. And they say it with **RE-ORDERS**—back their opinions with money because the Lipe Pneumatic Bar Feed has definitely proved its worth as a production booster.

Investigate now. Don't let another day pass until you find out why other plants are ordering and re-ordering this valuable production aid. A nearby Lipe technical representative will call on request.

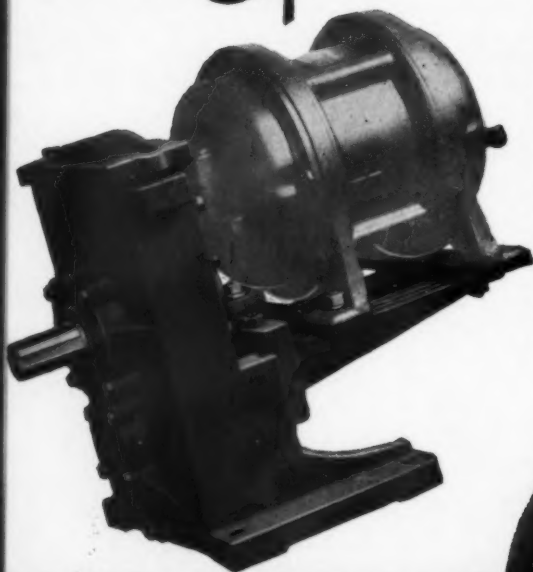
1. Feeds entire bar to last remnant automatically.
2. Will not feed short.
3. Will not scratch or mar the stock.
4. Exact size polished stock can be used.
5. Saves from 15 to 20 minutes per 12' bar.
6. Easily and quickly re-loaded.
7. Available for all manual screw machines up to 2½" capacity. Also for automatic screw machines No. 00, No. 0, No. 2 and No. 6.



● The Lipe Pneumatic Bar Feed consists of an air cylinder long enough to enclose a full-length stock bar. A piston within the cylinder carries a ball-bearing cup center to support the free end of the stock bar. As the collet is opened, low pressure air moves the piston, advancing the bar to the fixed stop. The action is fast and accurate.

CULLMAN

Speed reducers



Motor mounting permits universal adjustment which admits application of any make motor and greatly simplifies installation. Cullman Reducers made in single, double and multiple reduction types, in sizes motors ranging from 1/8 to 10 h.p. The drive mechanism is simple and sturdy, comprising pinion and chain and sprockets, Timken roller bearings and helical gears all operating in oil, and in a dust and dust proof case.

**MODERN DRIVES FOR
MACHINE TOOLS. SEND
CATALOG.**

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ANY MAKE
OF MOTOR**

**THE CULLMAN WHEEL
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